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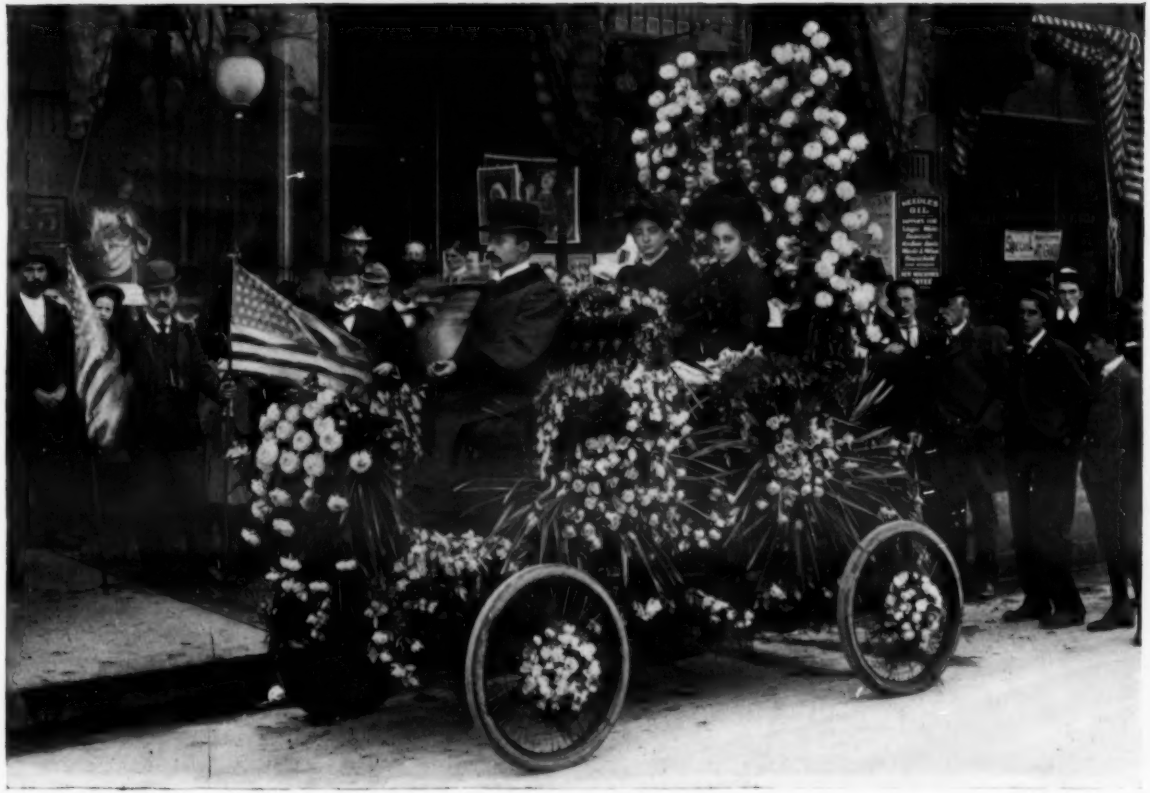

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Parade of Automobiles in Boston

(By Our Special Correspondent, Mr. O. L. Stevens)

DESPITE its bad pavements, its crooked streets, and a hill or two in troublesome places, Boston is proving itself friendly to automobiles. It had its second automobile parade on the morning of Monday, October 15, and not only did it provide a clear path, without which the display would have been flat and ineffective in the crowded streets, but hundreds of people turned out who were willing to wait some time along the sidewalks for a chance to witness it. Its Mayor turned out in state, escorted by City Messenger Leary and his staff of office, and stood in the cleared space in front of City Hall to watch the automobiles as they passed. Where the route lay through the downtown streets the number of people who were ready to snatch a few minutes from business to get a look at the procession made crowd enough to swell out from the sidewalks to the pavements in an unbroken mass, choking travel at every corner, and giving each squad of police enough to attend to.

This second parade owed little to the first one, for that was merely the turn-out of about thirty big electric delivery wagons one morning early in the summer, when an enterprising department store adopted electricity for its retail delivery system in place of horses, and it lacked the police co-operation necessary to make it much of a spectacle. This last parade fell far short of what it was planned to be. It had been announced that a big automobile tallyho would lead off, carrying a band of music; that

one of Boston's two horseless fire-engines would probably be in line, and that a heavy steam van which is being perfected by a company of promoters formed here some months ago would be a feature. All this talk was only what was to be expected when it was remembered that the parade was instituted as an adjunct of the industrial fair or exposition which was recently held in Mechanics' Building, and which had an automobile department as one of its features. These prominent novelties all failed to appear, however. So did the electric delivery wagons from the news company, milk contractors and mercantile houses, which are together using about sixty-five of them daily in the city. On the Saturday morning previous to the parade day it looked as if the chances were against having more than a score of vehicles in line.

Messrs. John Brisben Walker, Jr., and Homer W. Hedge, Leaders of the Parade

There were just forty-three vehicles in the parade. The line was to have been formed on Huntington avenue, in front of the Exposition Building, at nine o'clock. When that time arrived, however, there were but three handsome little electric delivery wagons drawn up by the curb outside the building, and nothing else in sight to show that anything of a horseless nature was in contemplation. The avenue was as quiet as a Sabbath morning,

and half a dozen men and boys beside the waiting wagons were the only semblance of a crowd. But what a change took place in the following half hour! Soon horseless carriages of all types were in evidence.

The parade was late in starting. Mr. Harry Fosdick, local manager for the Mobile Company of America, in one of their runabouts, acted as marshal.

When the procession finally did get under way, at seven minutes past ten o'clock, it was led by Mr. John Brisben Walker, Jr., in a steam mobile runabout, with Mr. Homer W. Hedge, of the Automobile Club of America, New York, beside him. Behind, in a Columbia electric stanhope, was Mr. Knight Neftel, manager of the New England Electric Vehicle Transportation Company, with Mr. C. E. A. Merrow, one of the agents of the Mechanics' Building Exposition. Then came Mr. Joseph L. French, who made a run over the road from his city to Chicago this summer, driving, as on that trip, a gasoline carriage of the St. Louis Motor Carriage Company's make. After him came a line of twelve mobiles, some driven by representatives of the manufacturers and others driven by their owners. Among these were Dr. M. E. Stevenson, Mr. Paul Goodrich and Mr. Philip Gokey, of Allston; Dr. W. E. Chase, Professor Morse, of the Cambridge Manual Training School, and Mr. Fred. Ellis, eastern agent of the Mobile Company. One or two of these carriages had tops, but the majority were of the runabout pattern and without any decoration whatever.

A line of miscellaneous styles and types of pleasure vehicles followed. Lieutenant Philip McBryan, from Police Division 14, was on hand in the canopy-top Locomobile which has been described in the Boston newspapers from time to time and which once had the distinction of running away with its driver. He had Sergeant Murphy of his own division with him, and the pair attracted considerable attention from many who recognized them along the line.

So many of these carriages were of the steam runabout pattern that it was somewhat of a relief to see three electric stanhopes of the Edison Electric Illuminating Company in the line. They are finished in plain black, with wire wheels. A little novelty, too, was furnished by the carriages put in by the Boston branch of the Woods Electric Vehicle Company. There was a handsome stanhope, the body finished in black and gilt, with red running gear; an open runabout driven by J. W. Cushman, superintendent of the company's station here; while Mr. C. E. Humphreys, the local manager, drove a top runabout.

A carriage of the Milwaukee Steam Motor Company next came along, driven by Mr. L. J. Phelps, of Melrose Highlands, senior member of the firm of Phelps & Taylor, Eastern agents for

Woods Electric Cab

the carriage at East Somerville, Mass. This carriage had a clever device for reading the gauges and water glass at night. A small incandescent electric lamp was placed just under each

gauge, and another just behind the water glass, all being connected with a dry battery so that whenever it was desired to take a reading the operator had but to touch a button in the base of the seat and the lamp would show light as long as the button was pressed.

Of the business vehicles which formed the second division the most interesting in appearance was the Locomobile surrey entered by Mr. B. F. Keith. It showed no advertising whatever, but was a mass of flowers, mostly roses and chrysanthemums,

Wagonette of the New England Electric Vehicle Transportation Company

while in a bower built around the rear seat sat Miss Catherine McNally, of Dorchester, and Miss Evelyn Crosby, of Brookline. Mr. W. B. Thompson acted as *chauffeur*. The photograph of this carriage shows it standing on Tremont street just before entering the parade, with Mr. Keith himself in the background.

Interesting in another way was the sombre electric delivery wagon of Cobb, Aldrich & Company, one of Boston's big grocery firms. This was the first automobile delivery vehicle used in this city, and was made by Colonel A. A. Pope's company before that

company was merged into the electric vehicle combine. Then came three Riker electrics of the R. H. White Company, one of which was bright green, another rich blue, and the third deep crimson; then the Woods electric vehicle of A. Shuman & Company. All the carriages named are handsome vehicles. One of White's wagons was the second to be introduced in Boston for business uses, following that of Cobb, Aldrich & Company.

Few vehicles that could carry more than three or four persons at a time have so far been seen in Boston, in spite of the agitation for automobile omnibus lines, and perhaps that was one reason why the electric wagonette, which had been in use some days previous as a station wagon to carry prospective customers of a well-known clothing house to and from trains, was conspicuous in the line. It was covered with advertising matter, but there were passengers enough inside to show that twelve-seated wagons are practicable, even when operated by electricity. It, like the National Biscuit Company's wagon, and several others in line, were of the type leased from the New England Vehicle Company. That company did not enter any carriages directly, though five of the regulation type of cabs brought up the rear filled with newspaper reporters. Just preceding them was a Woods cab. These six were the only public carriages in the parade.

When this aggregation was once in motion, though in decoration and variety of type it might have been more striking, perhaps, its progress was more creditable than might have been expected. Heavy rains of the preceding few days had left the pavements slippery and the macadam surfaces thick with wet mud. The route took them first up Huntington avenue; then along on Massachusetts avenue, past the new Symphony Hall; then down Beacon street until Beacon Hill was reached. In dry weather this long, steady slope is taken easily by all kinds of passenger automobiles, but in the slime of that morning there was a chance that some of the heavy electrics would falter. However, there was not one but what took the rise, slime and all, without a quaver. It was probably about six or seven miles an hour for the whole route. Leaving the hill, the path lay through the business streets, with their Belgian block pavement; through State street, and around by Summer and Washington streets uptown again; thence through Massachusetts and Huntington avenues back to the Mechanics' Building. It took until 11.20 o'clock to cover the route, and it was accomplished without delay or serious accident.

The Use of Alcohol in Operating Automobiles

ONE who has done much experimenting along the line of substituting alcohol for petrol in the propulsion of motor vehicles is M. C. Henriod, a French automobilist of some repute.

In a recent issue of the *Autocar* there was published a translation of an article by M. Henriod on the subject, and as it is one which should interest all who are interested in the new pastime we give extracts below:

It may be said that all makers of motors and automobiles have recognized the advantages which would accrue from the possibility of employing alcohol in lieu of petrol. M. Henriod suggests that many manufacturers have experimented with alcohol in this regard, have succeeded in a greater or lesser degree, have found that alcohol gives greater power in the proportion of one to two per cent. per horse-power, but after some hours' work have also discovered that their engines required thoroughly cleaning, owing to the green copper obliged to be introduced into alcohol by the excise authorities. This substance is a carbonate of copper, which frequently crystalizes, so that the difficulty of dealing with a peculiarly detrimental foreign substance is added to those of the evaporation of the alcohol, the lubrication, and the oxides of copper rapidly deposited on the inner surfaces of cylinder, carbureter, etc. This objectionable substance deposits in the small tubes and orifices, and chokes them. Thus the use of commercial alcohol in motors suffers considerably from the presence of this substance, which resists carburation and renders lubrication most difficult. The lubrication of the cylinders of motors driven by alcohol requires the most careful attention, as even pure alcohol destroys the lubricants. With regard to the exhaust gases, these have so great an affinity for water that they disperse without odor. Thus in order to obtain as good results with alcohol as with petrol, it is necessary to combat the action of the green copper and the destruction of the lubricating substances by the alcohol itself. After several years of study and experiment, M. Henriod asserts that he has succeeded entirely as to this, not by precipitating the green copper, which would only have increased the evil, but by his method of carburation and the position of the carbureter with regard to the motor. The debased or denatured French alcohol is dearer than petrol, as methylene, a carburet of

hydrogen, the price of which is 150 francs per hectolitre, is present in such proportions as to augment its price considerably.

"Happily," says M. Henriod, "I have been able to reduce the price of alcohol considerably by carbureting it with other products sixty per cent. cheaper, and which can be sold at 45 francs per hectolitre.

"The consumption per horse-power per hour is about the same as that of petrol, being 350 to 450 grammes with petrol at 700 grammes, and 450 to 500 grammes with alcohol carbureted at 820 grammes.

"It should not be forgotten that the output of petrol is limited, that it is a necessarily diminishing product, and that, by reason of the fact that use of petroleum as a locomotive fuel is on the increase, petrol will thereby be made scarcer. On the other hand, the production of alcohol is unlimited, as it is capable of distillation from many descriptions of vegetable matter and refuse. By my latest patented methods, patented in France and Germany," continues M. Henriod, "I make possible the profitable use of debased or denatured alcohol in all motor systems, with alteration to their present form of construction." Notwithstanding his success with the *debased* alcohol and its coppery annoyances, M. Henriod trusts that the Ministers of the Interior and of Agriculture will retain their present disposition to rescind the regulations which oblige the use of *green copper* and methylene for the purpose of rendering alcohol nauseous as a commercial product.

Blimton Buys an Automobile

By Isaac R. Rich

MARIA, I'm going to buy an automobile. I've got tired of having a horse laid up with a spavin and pink eye, and besides I want to be up-to-date. Horses ain't in it nowadays, Maria, and we'll show those Newburgs we can keep up with the procession as well as they. Got the machine all picked out and it'll be up here to-morrow. Don't try to run it till I get home—it might balk, you know," and Blimton smiled serenely at his little joke on the timid Mrs. B.

"Are you sure you'll like it, Henry—you know you're very fond of old Dolly and always said you didn't want any better roadster. Then, you know, I'm a little timid about any kind of machinery, and——

Blimton Buys an Automobile

"There you go, Maria, trying to throw cold water on my attempts to be modern. But I won't be held back or kept back. I'm no old fossil if I am fifty-two years old. And I'll sell Dolly to-morrow—see if I don't. Good roadster, eh—why she can't do over ten miles an hour to save her from the glue factory, while my new carriage will do forty. Wait till you see Henry Blimton the most-talked-of man in Orange County. To-morrow we'll try the new horse."

Blimton went downtown to business and Mrs. B. drove over to see her father.

"Father, I want you to come over to-night and buy Dolly—for a few days. Henry has another scheme on hand. Bought an automobile to-day and is going to sell Dolly right away. Has the up-to-date fever bad this time. Thinks I'm a fossil, etc., because I didn't enthuse, but I remember too many other plans to get up much enthusiasm now. But don't fail to come and buy Dolly. He'll want her back in a week and she's the safest horse he can have."

That afternoon Blimton came home early and Mrs. B. prepared for a circus—she had been there before.

"Now we'll have a ride as is a ride—where's the auto, Maria? In the stable, I suppose.

"Now, then, we'll try her; jump in, Maria—what's that—rather wait till you see me perform. Perform, is it? Well, there won't be any performing to it. I'll show you how gracefully an auto runs. Skims like a bird and dosn't get tired or go lame."

"Didn't you get any instructions, Henry? Seems to me they ought to send a man with you to show you how till you get used to it."

"Instructions nothing. Don't want any teacher round me showing me which is my right hand. You seem to forget that I'm a mechanic. Don't remember the time I used to work in the shop, eh—in overalls, too, Maria. Well, I haven't forgotten and I'll show you the practical advantages of it now.

"These machines are simplicity itself. Just turn on the oil, start your motor and away you go. Now I turn on the oil—so—and start the—What in blazes did he do next? Oh, yes; get your cylinder right so it will start—get a confession he called it, I think, but how did he do it?

"This handle, Maria, goes here; now I give a turn, so, and the motor starts—Don't hear it, eh—well, I don't myself; guess I better try it again—now.

"What's the matter, anyhow; Maria, have you fooled with this any? No—well, what ails it, then. Instructions, eh—con-

found the instructions—the thing won't start, that's all. Instructions are all right, but when a motor won't start it won't, and that's all there is to it.

"What's this little button here? Why, the sparker, of course, and I forgot to turn it on. Now, we'll try again. Ha! she starts! she moves—Maria, behold, the motor motes and I mount the modern vehicle of conveyance. I'll be back in time for tea—whoa, there, Dol—what ails the thing, anyhow," for he was sailing down the road at a great rate, having grabbed the high speed lever and stepped on the regulating button thinking it was the gong.

He soon slipped off of this and threw himself back, applying the brake and nearly going over the dashboard, while Mrs. B. looked on with fear and trembling. He finally got the thing slowed down, after running over two dogs and just missing a baby carriage; but he wasn't happy, and wanted to go home. How to do it was the question.

He didn't trust himself to try and run it backwards, and he couldn't turn it around in the road. So he finally threw out all the levers and let the motor run. Then he climbed down, and after much pushing, pulling and sweating, he succeeded in aiming it the right way, while the small boy made sundry and divers remarks on the beauties of having an auto and pushing it yourselves. Small boys have a way of making interesting remarks of this kind at inopportune times.

After careful manipulation he finally reached home, and Mrs. B. was so glad he wasn't killed that she suppressed the great desire to "I told you so," at Mr. B.'s expense. Mr. B., however, forgot to enlarge on the beauties of automobilism, and devoted most of his remarks to the state of the weather and other equally interesting topics.

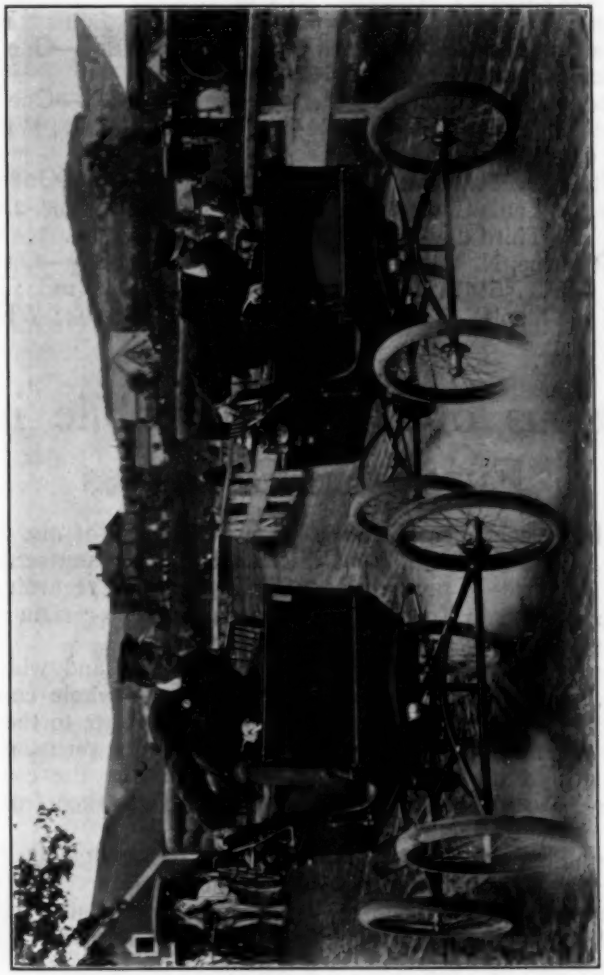
I haven't heard when he expects to give it another whirl, but shall try to be around when he does.

Locomobile Races at Binghamton, N. Y., Industrial Exposition

THE races between two Locomobiles at the above-named exhibition, held October 6, proved quite a drawing card, and was the first occasion which the Binghamton public had had of witnessing such an event. It was one of the most interesting features of the exposition.

Locomobile Races at Binghamton, N. Y.

The contestants were, respectively, Mr. Roy W. Whipple and Louis R. Clinton, both residents of Binghamton, and both have Locomobiles.



Roy W. Whipple and Louis R. Clinton, Racing their Locomobiles

The following account is taken from the Binghamton *Chronicle:*

The gentlemen named have raced at a number of fairs in

various parts of the State. The following are the times made at various places by the two men:

Owego, N. Y., September 4 to 6. First day—One mile; time, 2.14; won by Whipple. One mile; time, 2.13½; won by Clinton. Second day—One mile; time, 2.12; Louis Clinton. One-half mile; time, .57; Louis Clinton. Third day—One mile; no official time; Whipple.

Oneonta, N. Y., September 11 to 14. First day—One mile; time, 2.12; Louis Clinton. One mile; no official time; Whipple. Third day—One mile; time, 2.12½; Whipple.

Afton, N. Y., September 18 to 21. First day—One mile; time, 2.07; Louis Clinton. Second day—One mile; time, 2.07½; Whipple. Third day—One mile; time, 2.07; Clinton.

Sherburne, N. Y., September 25 to 28. First day—One-half mile; time, .56½; Whipple. Second day—One mile; time, 2.07⅗; Whipple. Third day—One mile; time, 2.04; Whipple.

Status of the Automobile in European Countries

THE Department of State, upon the request of one of the large American firms interested in the manufacture of vehicles to procure statistical information regarding the vehicle industry in Europe, sent a circular letter to certain of the consuls asking for information on the subject.

The replies relate to all classes of vehicles, and while, of course, it wauld not be possible to give the whole contents of these letters, we give such of them as relate to the auto mobile, the number in use and general information regarding the popularity of the new mode of conveyance and the common opinion as to its future. Below are given facts taken from the replies of the various consuls:

Beginning with Austria we find that the automobile trade, although still in its infancy, is developing rapidly. Two years ago automobiles were little known in that country, but since that time they have been manufactured there. In 1870 Herr Siegfried Marcus, of Vienna, drove a benzine motor car.

Thanks to the former prime minister, Count Badeni, who was convinced of the value of automobiles by Mr. J. Lohner, the way was made easy for them, as far as the police and magistrates were concerned. In twenty-four hours after the matter was laid be-

fore him, the necessary permission for their use in the streets of Vienna was given. This was some four years ago, and now they are allowed everywhere, even in the Prater, the great park of Vienna. The press has come to the help of the automobiles, giving a separate column to them, and the second automobile race was held in Vienna in May, this year. There is, however, one great hindrance to the use of the automobile in the provinces, for benzine is not much used, as in France, and, besides, the sale of it is in control of the police, who are very strict in regard to it, so it can rarely be bought in sufficient quantities except at high retail prices. But efforts are being made, and will probably be successful, to enable purchases of benzine to be made at convenient places and at moderate cost.

BELGIUM

Here, as is the case pretty much everywhere, the automobile has already been introduced and is rapidly becoming popular, although its comparatively high cost renders it at present rather an object of luxury than of general use.

It is estimated that in Brussels alone there are owned about 300 machines of different makes, and already one or two large retail establishments have auto delivery wagons running. There are quite a number of establishments engaged in the manufacture of this style of vehicle and there seems to be a growing tendency to found new ones.

The largest manufacturing establishment in this country engaged in this branch of industry, according to the best information obtainable, is the Fabrique Nationale d'Armes de Guerre, at Herstal, near Liege, which has successively added to the object for which the company was formed (the manufacture of firearms), that of bicycles and lately that of automobiles. It is stated that this firm alone on the 1st of April had orders for the building of 100 carriages of different sorts.

FRANCE

This branch of the vehicle industry is increasing enormously. It is estimated that 30,000 are in circulation at the present time in the Paris consular district.

The most popular are petroleum automobiles, because fuel can be obtained everywhere. The "Voiturettes," a very light automobile with two or four seats, sold at from $400 to $1,000, are at present most in use.

GERMANY

It has already been stated in the report of this series describing the International Motor Carriage Exposition held at Berlin in

September of last year, that although nearly all hydrocarbon motors, including the Daimler machine and all variations of the Otto gas engine, are substantially German inventions, automobilism and the manufacture of motor vehicles has developed much more slowly in this country than in France, Belgium, or even England. It was not until the exposition of last year was organized that the motor carriage appeared on the streets of Berlin, and even now there are only twenty-four registered for use by private individuals. Besides these, however, there are as many more driven for advertising purposes by agents of motor-carriage makers located there and in other cities. There are twenty electrical omnibuses in service in Berlin, and more are being built as rapidly as possible, and perhaps a hundred electrical and hydrocarbon motor drays, delivery wagons and business vehicles of various types.

There were represented at the exposition of 1899 thirty-two makers of motor vehicles in Germany, nearly all of whom, except the Daimler Company, at Cannstadt, and the Benz Motor Wagon Company, of Mannheim, had been previously manufacturers of bicycles, wagons and carriages, or electrical machinery.

ITALY

The motor-car industry in this country is still in its infancy. Two concerns of importance have started works in Milan, viz., Prinetti Stucchi, having a very large plant in connection with their carriage and bicycle works, and C. Bianchi. There is also one establishment for automobiles in Rome, but it is of recent creation and has not reached any importance. A certain number of automobiles of foreign make have been introduced into this country and have met with public favor, which should be encouraging for the future development of that industry in Italy.

GREECE

No automobiles are manufactured in Greece, and thus far but two have been imported, both into Athens; but it is said that many Athenians wish to purchase such vehicles, and it is expected that quite a number will be imported in the near future.

NETHERLANDS

Automobiles have thus far not been very popular in the Netherlands, and will probably not become so until the prices at which they are sold ($600 to $1,200) have gone down considerably. With the smooth, level roads of this country there would probably be a very good field for them here if the cost were less.

In regard to American vehicles in the Netherlands, I think there would be a good opening for them.

Tabulated Data Regarding the Hill-Climbing Contests in Great Britain

IN April and May of this year the Automobile Club of Great Britain conducted a number of hill-climbing tests. The results of these have been put in tabular form by W. Worby Beaumont, who is well known to automobilists. This table we reproduce from the *Autocar,* of London, and while it is, to a great extent, self-explanatory, we print the remarks of Mr. Beaumont regarding it. He says:

"In a large number of instances the power of the motor as stated by the exhibitor is misleading, as it is the maximum power given by the motor for a very short time on the brake—a power which cannot be realized for a long time, more especially with the air-cooled motors.

"On the other hand, some few of the exhibitors understated the power of the motors as used. In many cases the power given is correct, as that of the motor at its normal speed as controlled by the governor, but when the latter is cut out by the accelerator, the power may rise in proportion to the increase in speed for at least a considerable increase, and hence a 12 horse-power may give 16 horse-power, a 5½ horse-power may give 6½ horse-power, and a 3 horse-power may give 3½ horse-power. It is, therefore, necessary to take into consideration the particular speed which may have been in gear when hill climbing, and know at least approximately the full speed of the motor when running on the accelerator with that gear.

"In the calculations, the results of which are given in the table, the road resistance was taken as 45 pounds per ton for pneumatic tires and 55 pounds for the solid tires. For the Birkhill trials a somewhat higher figure was taken, the road surface not being in so good a condition, partly as a consequence of the wet weather. It may be mentioned in this connection that a 5 per cent. error in the assumed road resistance only involves a mean error in the final result of 1 per cent. The importance of exactness on this point is therefore not great. In the last column of the table is given a corrected mechanical efficiency of four of the vehicles which attracted most attention. These results are

Number Class.		Name.	Total Weight Including Passengers.		Horse-power of Engine stated by Maker.	Transmission Gear.
			*cwt.	qrs.		
A.	1	Benz Ideal. Messrs. Hewetson's	13	1	3	Belt, chain
"	2	Benz Ideal. Messrs. Hewetson's	13	0	3	Belt, tooth, chain
"	5	Locomobile Steam Carriage	8	1	2*c*	Chain
"	16	Gladiator Voiturette		0	3 25	Chain, tooth
"	27	New Orleans Car. Messrs. Burford & Van Toll	8	2	3	Belt, tooth
"	28	New Orleans Car. Messrs. Burford & Van Toll	8	2	3	"
"	33	Decauville Car. The Motor Car Co	8	3	3·5	Tooth
"	34	Decauville Car. The Motor Car Co	8	2	3·5	"
"	41	International Victoria	11	0*a*	3	Belt, chain
"	44	International Victoria	10	2*a*	3	"
"	51	Star Voiturette	11	2*a*	3·5	"
"	52	Roots & Venables Car		2*a*	2.87	Chain
B.	14	De Dion Voiturette. Mr. R. Fuller	9	2	3	Tooth
"	15	De Dion Voiturette. The Motor Power Co	9	2	3	"
"	24	Marshall Carriage	15	1	5.0	Belt, chain
"	31	Renault Car. The Motor Car Co	9	0	3·5*c*	Tooth
"	32	Renault Car. The Motor Car Co	9	0	3·5*c*	"
"	40	Wolseley Voiturette	15	2	3*d*	Belt, tooth, chain
"	49	Marshall Carriage	14	3	5	Belt, chain
C.	8	Daimler Phaeton. Motor Manufacturing Co	25	2	6	Tooth, chain
"	9	Daimler Phaeton. Motor Manufacturing Co	25	3	6	"
"	23	Whitney Steam Car. Messrs. Brown Bros	12	2*a*	3.8	Chain
"	26	Peugeot Carriage. Mr. Friswell	19	3	8	Tooth, chain
"	35	Daimler Car. The Daimler Co	21	2	6	"
"	36	Daimler Car The Daimler Co	26	1	6	"
"	37	Daimler Parisian. The Daimler Co	22	0	6	"
"	46	Georges Richard Car	21	0	7	Belt, tooth, chain
"	47	Georges Richard Car	21	0	7	"
D.	22	Lanchester Car. Mr. Millership	16	0*a*	8	Worm
E (*a*).	12	De Dion Tricycle. Motor Manufacturing Co	3	0*a*	2.25	Tooth
"	20	Simms Motor Wheel	4	2*a*	2.75	"
"	39	Century Tantem Tricycle	5	2*a*	3	Chain
E (*b*).	3	Ariel Quadricycle. Mr. J. Stocks	6	2	3.15	Tooth
"	4	Ariel Tricycle with Whippet Trailer	5	2	2.25	"
A.	A25	Benz Ideal. Mrs. Bazalgette	12	2	3	Belt, chain
B.	A24	Mors. Voiturette. Mr. Phillips	13	2	4	Tooth, chain
C.	A2	6 h. p. Panhard. Mr. Butler	21	3	6	"
"	A3	6 h. p. Panhard. Mr. Browne	20	3	6	"
"	A7	6 h. p. Daimler. Mr. Harmsworth	18	2*a*	6	"
"	A10	8 h. p. Napier Mr. Kennard	26	0	8	"
"	A12	6 h. p. Daimler Mr. Edmunds	20	2	6	"
"	A21	6 h. p. Daimler Mr. Pitman	24	2*a*	6	"
"	A23	6 h. p. Daimler. Mr. Cordingley	23	3*a*	6.25	"
"	A26	6 h. p. Daimler. Mr. Gregson	25	3	6	"
"	A30	6 h. p. Daimler. Mr. Siddeley	20	2	6	"
"	A31	6 h. p. Daimler. Mr. Johnson	24	2	6	"
"	A4	8 h. p. Panhard. Mr. Mark Mayhew	20	1*a*	8	"
D.	A11	12 h. p. Daimler. Hon. J. Scott Montagu	23	3*a*	12	"
"	A17	12 h. p. Panhard. Hon. C. S. Rolls	26	1	12	"
"	A22	12 h. p. Daimler. Mr. J. A. Holder	30	1	12	"
"	A29	7 h. p. Peugeot. Mr. Mark Mayhew	19	2*a*	7	"
E (*a*).	A16	Ariel Tricycle. Mr. A. J. Wilson	3	2*a*	2.25	Tooth
"	A20	Empress Tricycle. Mr. H. Ashby	3	2*b*	2.75	"
E (*b*).	A28	Enfield Quadricycle. Mr. E. M. Iliffe	6	2*b*	2.25	"

a Weight based on maker's statement
b Estimated.
c The De Dion water-cooled engine used in this car is generally stated to give 3 h. p., and this figure has been taken in calculating the efficiency.
d Both passengers off temporarily.
e One passenger off temporarily.
f Two passengers off temporarily.

Hill-Climbing Contests in Great Britain

Taddington Hill.		Shap Fell. (1).		Shap Fell. (2).		Dunmail Raise.		Birkhill.		Apparent Mechanical Efficiency of Vehicle.	Corrected Mechanical Efficiency of Vehicle.
Average speed in mls. per hour on rise of 651 ft. in 13,320 ft.	Average actual h. p. at driving road wheels.	Average speed in mls. per hour on rise of 840 ft. in 38,300 ft.	Average actual h. p. at driving road wheels.	Average speed in mls. per hour on rise of 500 ft. in 7,338 ft.	Average actual h. p. at driving road wheels.	Average speed in mls. per hour on rise of 450 ft. in 9,040 ft.	Average actual h. p. at driving road wheels.	Average speed in mls. per hour on rise of 460 ft. in 10,560 ft.	Average actual h. p. at driving road wheels.	per cent.	
5·39	1·56	....	....	....	....	5.01	1.47	6.0*d*	1.57	51.	
7.18	2.06	11.5	2.07	4.8	1.76	6.64	1.02	6.6*d*	1.65	61.5	
9.76	1.86	6.0	....	6.64	1.61	9.79	1.89	10.9	1.98	61. *k*	
8.17	1.24	....	....	....	....	7.67*e*	1.185	7.5*d*	0.995	32.6	
6.3	1.125	....	....	4.42	0.88	6.22*d*	0.985	7.7	1.28	35.7	
6.05	1.10	....	....	....	....	4.74	0.80	....	....	31.6	
6.7	1.20	....	....	....	....	5.13	0.84	....	....	34.0	
6.3	1.10	....	....	....	....	6.84	1.21	8.6*e*	1.23	39.4	
5.29	1.26	....	....	....	....	5.55	1.35	....	....	43 5	
6.17	1.43	....	....	....	....	6.04*e*	1.33	4.1	....	46.	
9.15	2.30	....	....	....	....	....	....	8.0	1.76	54.4	
5.8	1.205	....	....	....	....	....	....	....	....	42.	
....	....	13.5	1.612	7.24	1.79	9.79	1.94	10.9	2.04	61.5	
10.03	1.975	14.5	1.735	7.58	1.885	....	....	8.0*e*	1.41	58.3	
....	....	11.5	2.20	4.42	1.81	....	....	....	....	41.	
9.45	1.76	....	....	....	....	9.33	1.75	9.6	1.70	58.	
7.56	1.41	....	....	....	....	7.33	1.37	....	....	46.3	
10.08	3.21	13.0	2.52	6.37	2.59	7.9	2.55	8.6	2.62	89.5*l*	68.5
4.94	1.49	10.5	1.94	4.54	1.75	6.04	1.95	6.3	1.83	35.5	
5.29	2.785	10.5	3.37	5.14	3.47	5.86	3.13	6.5	3.26	53.5	
5.49	3.09	10.5	3.75	4.42	2.84	5.13	2.93	6.3*e*	3.26	52.8	
4.56	....	....	....	....	....	7.67	....	8.9	2.36	62.	
9.45	3.83	....	....	....	....	9.79	4.03	10.9	4.23	50.5	
6.3	2.94	13.5	3.98	6.37	3.72	7.9	3.70	6.8	3.03	55.7	
6.55	3.58	13.5	4.70	4.42	3.05	6.64*e*	3.72	6.6	3.43	61.6	
9.15	4.12	16.	4.27	....	....	8.92	4.06	8.0	3.45	66.2	
....	....	....	....	....	...	7.67	3.41	7.5	3.09*e*	46.5	
6.43	2.78	....	....	....	....	5.86*f*	1.86	5.0*g*	1.98	31.6	
8.62	3.01	11.5	2.54	4.98	2.22	6.84	2.41	7.7	2.57	31.9	
....	....	....	....	....	....	7.9	0.495	12.6	0.747	27.6	
9.45	0.87	....	....	....	....	....	....	....	....	31.6	
...	....	....	....	....	....	2.1 *d*	....	10.9*d*	1.68	36.2	
15.13*h*	2.03	20.5	1.67	6.64*h*	0.98	11.41*d*	1.42	13.3*e*	1.51	48.3	
14.4	1.62	20.5	1.41	6.64*dj*	....	8.22*dj*	....	12.6*dj*	....	67.5	
6.7	1.81	....	....	....	....	4.66	1.25	...	....	51.	
8.39	2.33	....	....	....	...	7.67	2.15	7.5	1.98	53.7	
5.69	2.54	10.5	2.86	4.8	2.74	6.22	2.81	5.7	2.43	44.6	
8.17	3.49	13.0	3.20	5.68	2.90	7.9	3.06	8.6	3.49	54.	
....	....	....	....	....	....	4.66	....	6.6*e*	2.62	43.6	
13.74	7.39	19.0	5.71	....	....	13.69	7.24	11.5	5.86	82.	70.5
6.43	2.89	....	....	....	....	7.08	3.1	....	....	49.8	
....	....	11.0	3.67	4.42	3.81	6.22	3.33	4.8	....	60.3	
6.3	....	....	....	....	....	....	....	....	....	....	
5.8	3.26	....	....	....	....	6.84	3.9	4.1*e*	....	59.7	
8.39	2.54	13.0	3.37	4.82	2.61	6.92	2.95	7.0	2.84	47.6	
8.17	3.9	11.5	3.35	5.68	3.43	7.9	3.32	8.2	3.93	59.7	64.
10.08	4.28	12.0	....	5.48	....	....	....	....	....	53.5	
11.19	5.46	....	...	....	....	5.26*f*	....	10.4	4.64	42.	
17.77	9.55	27.5	8.78	17.71	10.9	20.54	11.81	16.0	8.21	82.	65.5
14.4	8.94	....	....	7.24	6 4	10.27	6.44	10.9	6.46	57.6	
7.74	3.13	15.5	3.8	7.97	4.1	9.79	3.99	10.0	3.82	53.7	
18.91	1.35	18.5	0.815	....	....	5.13	....	6.8*j*	....	48.3	
....	....	20.0	0.88	15.94	1.46	17.06	1.25	7.5	....	43.2	
9.15*e*	1.11	....	....	....	....	9.33*e*	1.13	12.0*eh*	1.83	60.5	

g All off temporarily.
h Pedalling.
j Had to push.
k Brake h. p. of motor taken as 3.1.
l Brake h. p. of motor here understated.
Air resistance is not included in these calculations.
* Cwt., 112 pounds; qr., 28 pounds.

based on a consideration of the figures obtained on the speed trials, on the air resistance, as well as the hill trials. The air resistance at the lower speeds is small, but as the speed increases to the highest attained, the air resistance rises so rapidly that it exceeds the whole of the other resistances. If the air resistance be considered with reference to some of the tricycles and quadricycles, the mechanical efficiency will be raised, because, although the air resistance surface is small, their motors are not capable of giving off much or any more power than stated. The figures obtained on the 1,000 miles trial are very similar to and confirm those obtained on the Petersham and other tests in this country and abroad. On the whole, it appears that there is a good deal of room for improvement in the average car transmission gear, while the efficiency of some of the best is not only high, but is higher than is obtained in the transmission of the same amount of power in most other branches of machinery construction when the speed differences and changes require similar numbers of parts."

Election of Officers of the Buffalo Automobile Club

THIS club, on the 9th ult., elected an entirely new set of officers. The meeting, which was the first annual one the club has held, took place at the Genesee Hotel. The new officers are: President, Dr. Truman J. Martin; Vice-President, William C. Cornwell; Treasurer, Dr. Lee H. Smith; Secretary, Ellicott Evans; Consulting Engineer, A. F. Brown.

The club, as such, is intending to make a special effort to obtain a greater number of individual owners as members. It is expected that this will speedily be accomplished, and during the Pan-American Exposition, which takes place next year, considerable work will be done by the club in the way of entertainment of automobile owners who may visit Buffalo during the exposition season.

An Automobile Club for Brooklyn

THE necessity for an automobile club in the above-named city has been felt for some time and at last two or three progressive spirits have taken the initiative.

Roughly, the idea of the present promoters is to foster good roads and work in harmony with other good roads' associations; to gain and uphold whatever rights automobiles are entitled to; to arrange for parades, brushes on the roads, etc., thus arousing interest in what must naturally become a popular sport in the near future. It is proposed, if such be the sense of the meeting, to arrange for an automobile parade in the near future, to celebrate the organization and to show its strength.

That the automobile has come to stay and is rapidly gaining in popularity is now an acknowledged fact. Even the most virulent horseman, whose hatred for the new-fangled machine is aired upon every occasion, will admit this, and the level-headed ones are preparing to make the best of it. One horseman, the owner of a particularly high strung pair, even went so far recently as to enlist the services of a friend, who is the owner of an automobile, for training purposes. For two hours he forced his prancing and frightened team to face the machine and stand while it blew off steam. At first it took all his nerve and skill to control his team; after awhile they became quieter and finally so accustomed to the machine that, without trouble, they jogged along beside it, under all sorts of trying circumstances. If more of our horsemen would adopt this policy, instead of spending their breath in useless vituperations, the present strained relations between the two classes of pleasure seekers would the sooner be ended. The same antipathy existed when the bicycle first appeared, but has been successfully overcome. The horse which once shied, balked and ran away at the sight of the bicycle now pays no more attention to it than to any other style of vehicle. This horsemen should be quick to see, and the sooner they decide to accept the inevitable the better. It is a case of history repeating itself. The bicycle is gradually dying out. The automobile is coming to take its place. It is only the matter of a year or so when, like the bicycle, prices will drop, and then they will be nearly as common as the wheel.

Steam Wagon of The Adams Express Company

AT the recent meeting of the American Society of Mechanical Engineers, held at Cincinnati, Mr. Arthur Herschmann, Mechanical Engineer of the Adams Express Company, read a paper entitled "Automobiles for Heavy Transportation," in which he described in detail a steam express wagon designed by him for the company named.

Recently representatives of this publication saw this wagon under steam. As will be seen from the accompanying illustra-

Steam Wagon for Adams Express Company

tion the wagon is of heavy construction, weighing when unloaded about three tons. The motive power is steam, the boiler being placed at the front. A steam pressure of 200 pounds is carried. This boiler is provided with two pressure gauges, both of which are connected.

Steering is done by a hand wheel and rack and pinion movement.

Steam Wagon of Adams Express Company

On the inside of each of the rear wheels is placed an internal gear, to the outside of which are applied band brakes, a groove being cut to receive them. These are applied by a lever placed at the right hand of the driver.

The wheels are of heavy construction, with wooden spokes, and having steel tires.

The engine is of the horizontal type, being placed on one side of the wagon, the cylinders being side by side. The engine, as well as gearing, is encased, thereby preventing dirt and dust from getting into the running parts.

Coke is used as fuel, this being stored in the front of the wagon in a space between the boiler and the front end of wagon.

There are two changes of speed.

Three water tanks are carried, two underneath the wagon at the back and one under the seat of driver. Just below the platform on the left side of the wagon is placed the feed pump.

The wagon is of very substantial construction and is made for carrying heavy loads.

Automobiles on Ferry Boats

THE manner in which the Board of Supervising Inspectors of Steam Vessels have seen fit to interpret and apply Section 4472 of the Revised Statutes of the United States furnishes a flagrant example of the arbitrary and injudicious spirit in which some persons dressed in a little brief authority abuse their power.

It is intended by this section to protect the public against the dangers attendant on the transportation of combustibles, and no one will deny that this is something which should and must be done. There is, however, a right as there is a wrong way of doing everything, and in this particular case the officials charged with the execution of the law have exhibited a gross lack of common sense and of proper consideration for the rights and convenience of the public.

The ferry boats which ply between Philadelphia and Camden are under the jurisdiction of the Steam Vessel Inspectors, and it has been decided that certain dangerous articles, among which are included naphtha, benzine, petroleum and loose hay or straw, shall not be carried on them. That is a wholly unobjectionable regulation. We will go further and say that it is a regulation eminently proper and necessary to be made. What we want to

call attention to and to condemn is the unreasonable and intolerant way in which it is being enforced.

There are many automobiles whose motor power is supplied by the combustion of gasoline. They have to carry a supply of that article with them, and they are wholly dependent upon it for their propulsion. It involves no risk to any one. It is safely stored away beyond the reach and beyond the possibility of destructive ignition. Yet the transportation of automobiles on the Camden ferry boats has been forbidden, if any naphtha or gasoline is concealed within their recesses, and on Sunday last a number of disgusted automobilists were compelled to pour the indispensable motor power into the street before they were allowed to make the passage. That was nothing less than a high-handed outrage for which there can be no justification. It was of benefit to no one, while it inflicted upon the victims the most serious inconvenience. They were unable to replenish their tanks and had much difficulty in reaching their homes.

The manner in which the regulation has been applied involves an arbitrary infringement of private rights, and shows that the officials responsible for it are in need of instruction in the true nature of their relations to the public. Their proper attitude toward the community is not that of master, but of servant, and their actions should be governed accordingly.

If the persons who held the automobiles up exceeded their authority they should be duly reprimanded. If they were only doing their duty according to the instructions of their official superiors, then those instructions need to be radically revised.—*Philadelphia Inquirer.*

"Ideal" Electric Runabout

A POPULAR style of motor vehicle is the runabout, and we illustrate herewith one which is operated by electricity. It is fitted with what is known as the "Ideal" bat-

"Ideal" Electric Runabout

tery, having thirty-six 12-plate cells, weighing 380 pounds. The motor, which weighs 150 pounds, possesses a new feature in that

the field and armature revolve in reverse directions. It is 6 horse-power.

The total weight of the machine is 800 pounds, and on asphalt roads it can run for 45 miles on one charge, while on ordinary country roads it will cover 30 miles without being recharged.

The vehicle shown has had one set of batteries in continuous use for more than fourteen months.

The wheels have tangent bicycle spokes and pneumatic tires, and altogether the vehicle has a very neat and compact appearance. The United States and French patents are under the control of Charles Cadmus, Hamilton, Ont.

Efforts are being made to form an automobile club in the city of Pittsburg. Among those who are owners of automobiles there are the following, and it is probable that most of them will become members: Glen Braden, Dr. J. C. Boggs, W. H. Minick, Wilson Arbuthnot, D. H. Hostetter, J. M. Lockhart, Robert Pitcairn, Jr., D. M. Glemson, James Gayley C. M. Schwab, W. L. Smith, R. B. King, F. C. Perkins, George Lauder, H. L. Goehring, C. B. McVoy, Thomas Hartley, R. W. Bailey, T. Alderdice, S. Jarvis Adams, S. Gayley, A. L. McMurtry, Florence O'Neil, J. M. Schoonmaker, W. L. Mellon, E. P. Mellon, Reuben Miller, W. Y. Humphreys, Dr. E. C. Huselton, W. M. Murray, J. H. Reed, C. F. Holdship, F. L. Stephenson and D. N. Seely.

It is said that Emperor William of Germany has announced that he will give prizes of 50,000 francs ($10,000) for a Paris-Berlin automobile road race. Comte de Talleyrand-Perigord, Vice-President of the German Automobile Club, has been appointed to work in conjunction with the Automobile Club of France to arrange details.

A rather inspiring cartoon, the ludicrous side of which was apparent at a glance, appeared recently in a German periodical. It depicted a field scene with an automobile just disappearing several hundred yards away from where the troops were following on the double quick time march. In fact the double quick time was so well exemplified that there seemed to be general chaos in the scramble to keep near the machine, which was stirring up enough dust to make its great speed seem obvious. On the driver's seat was a German General with helmet and a profile not unlike that of the German Emperor. His right hand was on the steering wheel and with his left he was beckoning to his men with his half face turned toward them. The caption read: "Follow me, men, if you can."

Comparative Tests of Electric Automobiles for City Service

NOW that the automobile industry is assuming such proportions some facts upon the commercial aspect of it ought to prove extremely valuable. These Mr. R. A. Fliess gives in a very exhaustive article published in the *Electrical World and Engineer* entitled, "The Electric Automobile from a Commercial Point of View." Mr. Fliess confines his attention to the electric vehicle, and we present herewith abstracts of the article referred to. In introducing his subject the writer says:

"Owing to the rapid changes and great improvements constantly being made in this new department of industry, the results obtained in an inquiry of this nature cannot of necessity be considered final. In fact, they must be looked upon as merely indicating the present state of development that has been reached in this branch of the horseless vehicle industry.

That the successful solution, from a commercial point of view, of the problems connected with mechanically propelled vehicles on common roads is not far off seems almost certain. But that there are many hard questions still left to be settled before the advent of 'the horseless age,' is recognized by all who have given close attention and thought to this subject.

We are living in an age of progress—of wonderful progress—and the present generation has become so accustomed to hearing of and seeing the results of great inventions that it has come to look upon all things as possible, and is very apt to underestimate and depreciate the difficulties which confront the inventors, engineers and manufacturers who are attempting to place the civilization of our globe upon a higher plane. That, in the case of the horseless vehicle problem, the difficulties to be surmounted are very great, does not seem to be generally recognized. That the workers in this field have been confronted from the beginning with what would seem to have been almost unsurmountable obstacles is, nevertheless, a fact, and that they have so far surmounted all barriers as to bring the horseless vehicle on common roads to its present state of development is a cause for general congratulation and a ground for just pride in the growth of the art.

That the electric automobile has reached a point in its development where it has begun seriously to enter into the daily com-

mercial life of such a city as New York is evidenced by the greatly increased number of such vehicles now operating upon its streets. It would seem, therefore, as though an inquiry as to its relative commercial value, compared with that of one of the horse systems with which it has entered into competition, would be of interest and benefit.

Owing to the nature of the problem which presents itself when an attempt is made to compare the two systems of locomotion from a commercial point of view, the most accurate and therefore the most valuable results can be obtained at present from a comparison of the electric automobiles used in light delivery service with horses and wagons engaged in the same class of service. For this reason light horse delivery service has been selected as a basis of comparison.

To facilitate the presentation of the data in hand this report, which is the result of an extended investigation, has been divided into three sections. In the first and present part, some tests on electric automobiles in the Borough of Manhattan are recorded. In the second the nature and amount of work required of horses and wagons engaged in light horse delivery service in the borough is considered, and its cost. In the third the results obtained in sections one and two will be compared.

It may be well to remark that all the data incorporated in this paper was obtained at first hands by the writer and is published here for the first time, and that all the results and conclusions reached are based entirely upon this independently collected data.

The tests were made in the Borough of Manhattan, New York City, and the conclusions reached are based on tests which covered over 250 miles on its streets with 10 vehicles of six different makes.

The object of the tests was to obtain data for the determination of the present commercial position of electric vehicles, and the greatest care was taken to insure accurate results. The number of vehicles tested, and the fact that they represent some of the best makes in the United States, adds to the value of the data that have been obtained.

The reasons for making these tests and the methods employed in obtaining the results to be presented need a few words of explanation.

For comparative purposes, from a commercial point of view, it is desirable to know how far an electric vehicle may be expected to travel on one charge of its battery in regular routine service over the streets of the locality in which it is expected to operate. This is to determine whether an electric vehicle can successfully

travel on one charge of its battery a distance equal to that required on one trip of vehicles drawn by horses engaged in the class of service with which a comparison is desired. Also the average amount of energy required by well-designed and properly-cared-for electric vehicles to propel them over the streets of the locality in which they are to operate under the various conditions of weather and pavement with which they are likely to meet throughout the year while fulfilling the functions for which they are intended, must be known.

The average speed which electric vehicles may be expected to maintain when in motion while engaged in actual service under the ordinary traffic conditions with which they will probably be confronted must also be known before a just comparison can be made, as well as their ability to overcome successfully all the obstacles which the horse-drawn vehicle, of the class with which the comparison is to be made, is obliged to "negotiate."

To determine these points, for the Borough of Manhattan, a number of electric vehicles of different makes and of several varieties were tested over the streets of the borough under ordinary traffic conditions until enough tests had been made to eliminate any chance of error that might have arisen had only one vehicle of any particular make been employed.

The method followed in collecting the data sought was to measure the distance covered on each test on a cyclometer which was tested several times against a known standard and was found to be accurate, while the amount of energy used on each test was obtained by means of a Thomson recording watt-hour meter which was calibrated several times during the period over which this investigation extended against the standard instruments of the Electrical Engineering Department of Columbia University. The instantaneous rate of power consumption was noted on a Whitney voltmeter and ammeter which were also calibrated several times against the standard instruments of the Electrical Engineering Department of Columbia University. The weight of the vehicle tested was obtained at the time of test on a pair of balanced Fairbanks coal scales—the same scales were used each time, to eliminate any chance of error which might have crept in from a change in scales. The speed at any moment during a trip was noted on a tachometer which was tested several times during the course of the investigation. The grades at the points where readings of the instantaneous rate of power consumption were taken were measured, so that in each case any variation in the rate of power consumption might be traced to its source. The elapsed time was noted at many points during each trip; also the

voltage on open circuit, and the distance traveled to the point, as well as the reading of the watt-hour meter. Therefore, at the end of each test a complete analysis of it was possible.

On account of the care that was taken to keep all the instruments used accurately calibrated and as free as possible from injurious shocks and jars which might affect them, it is thought that the tests presented in the following tables may be taken as representative of what may be required of electric vehicles in general to-day under similar circumstances.

Owing to the fact that many comparisons are made between the several vehicles of different makes noted in this section, it is thought desirable not to designate any of the vehicles by means of their makers' names, but rather to give to each vehicle noted in this section a designating letter. The object of this paper was not to compare different makes of electric vehicles, but to present original data of a sufficiently representative kind to make its comparison with data collected from tests on one of the several horse systems, with which the electric vehicle is now competing, of value.

Table I. gives in detail a complete analysis of a run of 31.5 miles made on one charge of battery by an electric delivery wagon designed for use in light delivery service. The conditions under which this test was made were perfectly normal. The streets over which the vehicle traveled were very crowded, and the route selected for the test included about as many hills as a vehicle may be expected to be called upon to go up and down in an average day's work under service conditions. The test is given in detail, to illustrate the method employed in all the tests made. The other tests presented are very much more condensed.

TABLE I.

[*Vehicle A.*]

Weight of vehicle	3,085 lbs.
Weight of passengers and instruments	305 lbs.
Weight of load carried	
Total weight causing drawbar pull on test	3,390 lbs.
Battery equipment	44 cells
Weight of battery	1,120 lbs.
Per cent. of battery weight to total weight of vehicle	36.3%
Per cent. of battery weight to total weight causing drawbar pull	33. %

Weather clear; no wind. Streets in good condition.

Principal ground covered on test: Fifth avenue, from Twentieth street to One Hundred and Tenth street; Fifty-ninth street, from Fifth avenue to Eighth avenue; One Hundred and Tenth street, from Fifth avenue to Eighth avenue; Eighth avenue, from Fifty-ninth street to One Hundred and Tenth street; Eighth avenue, from Twenty-first street to Forty-second street; Twenty-first street, from Fifth avenue to Eighth avenue.

Tests of Electric Automobiles for City Service

Total distance covered during test.....31.51 miles
Total time in motion during test.....3 hr. 23 min. 35 sec.
Average speed while in motion.....9.28 miles per hr.
Total watt-hours used on trip..... 4,892.8
Average watt hours used per car-mile..... 155.27
Average watt-hours used per ton-mile.....91.6

For a distance of.....1.44 miles
Time in motion was.....11 min.
Average speed while in motion.....7.85 miles per hr.
Number of watt-hours used.....216
Average watt-hours used per car-mile.....150
Average watt-hours used per ton-mile..... 88.49

For a distance of .....2.55 miles
Time in motion was.....14 min.
Average speed while in motion.....10.93 miles per hr.
Number of watt-hours used 328
Average watt-hours used per car-mile.....128.62
Average watt-hours used per ton-mile 75.88

For a distance of .....3.12 miles
Time in motion was .....18 min. 50 sec.
Average speed while in motion .....9.94 miles per hr.
Number of watt-hours used.....568
Average watt-hours used per car-mile 182.05
Average watt-hours used per ton-mile 107.4

For a distance of.....0 59 mile
Time in motion was .....4 min.
Average speed while in motion ..... 8.85 miles per hr.
Number of watt-hours used 62.4
Average watt-hours used per car-mile 105.76
Average watt-hours used per ton-mile 62.39

For a distance of.....3.2 miles
Time in motion was.....21 min.
Average speed while in motion ..... 9.14 miles per hr.
Number of watt-hours used 476.8
Average watt-hours used per car-mile.....149
Averege watt-hours used per ton-mile 87.9

For a distance of.....3.04 miles
Time in motion was .....17 min. 30 sec.
Average speed while in motion.....10.42 miles per hr.
Number of watt-hours used.....484.8
Average watt-hours used per car-mile.....159.47
Average watt-hours used per ton-mile 94.08

For a distance of .....2.55 miles
Time in motion was .....14 min. 50 sec.
Average speed while in motion.....10.31 miles per hr.
Number of watt-hours used 339.2
Average watt-hours used per car-mile 133.02
Average watt-hours used per ton-mile.....78.41

For a distance of.....3.12 miles
Time in motion was.....19 min 30 sec.
Average speed while in motion.....9.6 miles per hr.
Number of watt-hours used 550.4
Average watt-hours used per car-mile..... 176.41
Average watt-hours used per ton-mile..... 104.07

For a distance of....0.61 mile
Time in motion was....5 min.
Average speed while in motion....7.32 miles per hr.
Number of watt-hours used....64
Average watt-hours used per car-mile....104.92
Average watt-hours used per ton-mile....61.9

For a distance of....2.54 miles
Time in motion was....15 min. 30 sec.
Average speed while in motion....9.83 miles per hr.
Number of watt-hours used....353.6
Average watt-hours used per car-mile....139.22
Average watt-hours used per ton-mile....82.13

For a distance of....3.12 miles
Time in motion was....21 min. 30 sec.
Average speed while in motion....8.7 miles per hr.
Number of watt-hours used....548.8
Average watt-hours used per car-mile....175.89
Average watt-hours used per ton-mile....103.77

For a distance of....0.61 mile
Time in motion was....4 min.
Average speed while in motion....9.15 miles per hr.
Number of watt-hours used....72
Average watt-hours used per car-mile....118.03
Average watt-hours used per ton-mile....69.63

For a distance of....1.44 miles
Time in motion was....10 min.
Average speed while in motion....8.64 miles per hr.
Numbe of watt-hours used....224
Average watt-hours used per car mile....155.55
Average watt-hours used per ton-mile....91.77

For a distance of....1.53 miles
Time in motion was....13 min. 25 sec.
Average speed while in motion....6.84 miles per hr.
Number of watt-hours used....230.4
Average watt-hours used per car-mile....150.58
Average wait-hours used per ton-mile....88.83

For a distance of....2.04 miles
Time in motion was....13 min.
Average speed while in motion....9.42 miles per hr.
Number of watt-hours used....374.4
Average watt-hours used per car-mile....183.53
Average watt-hours used per ton-mile....108.27

Open-circuit voltage at beginning of run....95 volts
Open-circuit voltage at end of run....82.5 volts

Drop in 31.51 miles....12.5 volts

Running voltage at beginning of run....90 volts
Running voltage at end of run....76 volts

Drop in 31.51 miles....14 volts

Charging Battery After Run.

Charged for 3 hours at	20 amperes
Charged for 2 hours at	15 amperes
Ampere-hours put in during charge	90
Battery boiling hard at end of charge.	
Watt-hours put in battery during charge	7124.52
Watt-hours taken out of battery during run	4892.8
Open-circuit voltage before run	95 volts
Open-circuit voltage before charging	95 volts
Efficiency of battery	68.67%

A consideration of Table I. shows that vehicle *A*, with a load due to two persons and the instruments used, covered over 31.5 miles at an average speed of over 9.2 miles an hour, and that having traveled this distance its running voltage was still above 1.72 volts per cell, and its open circuit voltage still over 1.87 volts per cell, that the total average rate of power consumption was less than 92 watt-hours per ton mile, and that the maximum rate of power consumption noted was less than 108.5 watt-hours per ton mile.

As will be noticed, the total distance covered on this run was divided into 15 sections. On each section the time while in motion was observed, and from it and the distance recorded the average speed while in motion was calculated. In the notes taken while making the test, all momentary stops were noted and have been deducted from the time which elapsed while the vehicle was covering the distance given. Hence, the speed recorded in each section for the vehicle while in motion, it is thought, closely represents the best average speed which it would be possible to keep up on each section under ordinary traffic conditions. Thus, for instance, the first section includes a very crowded district for the greater part of its length. The second section, on the other hand, is never as crowded as the first, while the third section is usually a little more crowded than section two, but is seldom as crowded as section one. This condition is reflected by the average speeds recorded in the sections. It may also be interesting to note how the energy required on different sections varies. For example, in section two the vehicle was going down grade more than it was going up, while in section three it was going up hill more than it was going down. Thus the general contour of the ground over which the vehicle was traveling may be followed quite plainly.

A little over 25 miles of this test were covered while making four complete circles around the outside of Central Park. Table II. shows in a concise form the results obtained during this part of the test. Table II. is compiled from Table I., and affords a convenient means of comparing vehicle *A* with other vehicles traveling over the same ground.

TABLE II.

[*Vehicle A.*]

Once around Central Park—North on Fifth avenue, south on Eighth avenue.

For a distance of	6.26 miles
Time in motion was	36 min. 50 sec.
Average speed while in motion	10.19 miles per hr.
Number of watt-hours used	958.04
Average watt-hours used per car-mile	153.9
Average watt-hours used per ton-mile	90.31

For a distance of	6.27 miles
Time in motion was	41 min.
Average speed while in motion	9.17 miles per hr.
Number of watt-hours used	974.4
Average watt-hours used per car-mile	155.4
Average watt-hours used per ton-mile	91.68

For a distance of	6.28 miles
Time in motion was	39 min. 20 sec.
Average speed while in motion	9.58 miles per hr.
Number of watt-hours used	953.6
Average watt-hours used per car-mile	151.84
Average watt-hours used per ton-mile	89.58

Once around Central Park—North on Eighth avenue, south on Fifth avenue.

For a distance of	6.24 mile.
Time in motion was	38 min. 30 sec.
Average speed while in motion	9.78 miles per hr.
Number of watt-hours used	961.6
Average watt-hours used per car-mile	154.24
Average watt-hours used per ton-mile	90.99

Three times around Central Park—North on Fifth avenue, south on Eighth avenues

For a distance of	18.81 miles
Time in motion was	1 hr. 56 min. 10 sec.
Average speed while iu motion	9.72 miles per hr.
Number of watt-hours used	2,886.4
Average watt-hours used per car-mile	153.45
Average watt-hours used per ton-mile	90.53

READINGS OF INSTANTANEOUS RATE OF POWER CONSUMPTION AT DIFFERENT POINTS EN ROUTE.

Location of Vehicle When Reading was Taken.	Voltmeter Reading.	Ammeter Reading.	Speed in Miles Per Hour.	Kind of Pavement Traveling Over.	Per Cent. Grade at Point of Reading
62d st. and 5th ave.....Going N	90	22	9.75	A	.....
65th st. and 5th ave ..... " "	90	21	10.3	"	.....
68th st. and 5th ave..... " "	90	32	7	"	2.5
Passing Lenox Library..... " "	90	25	9	"	.....
Passing Synagogue door..... " "	90	21	10	"	.....
83d st. and 5th ave..... " "	90	24	9.5	"	.....

Tests of Electric Automobiles for City Service

Location of Vehicle When Reading was Taken.			Voltmeter Reading.	Ammeter Reading.	Speed in Miles Per Hour.	Kind of Pavement Traveling Over.	Per Cent. Grade at Point of Reading.
87th st. and 5th ave.	Going	N	90	32	7	A	2.5
88th st. and 5th ave.	"	"	90	28	7.3	"	2.5
110th st., bet. Lenox and 7th aves.	"	W	90	27	7.5	M	slight up
108th st. and 8th ave.	"	S	90	32	6.5	A	2.6
106th st. and 8th ave.	"	"	90	30	7.5	"	2.4
101st st. and 8th ave.	"	"	90	19	11.8	"	slight down
96th st. and 8th ave.	"	"	90	27	8	"	2.5
94th st. and 8th ave.	"	"	90	26	8.5	"	2.5
77th st. and 8th ave.	"	"	90	20	12	"	slight down
Passing San Remo door.	"	"	90	20	11.9	"	.....
Passing East End Spanish flats.	"	W	90	32	7.5	"	3.5
67th st. and 8th ave.	"	N	90	25	9	"	.....
73d st. and 8th ave.	"	"	90	20	11.4	"	.....
Passing San Remo door.	"	"	90	20	11	"	.....
82d st. and 8th ave.	"	"	90	28	8	"	.....
90th st. and 8th ave.	"	"	90	22	9.6	"	.....
103d st. and 8th ave.	"	"	90	20	11.3	"	.....
110th st., bet. Lenox and 7th aves.	"	E	90	18	15	M	slight down
106th st. and 5th ave.	"	S	90	25	8.9	A	2.25
104th st. and 5th ave.	"	"	90	30	7.5	"	2.25
103d st. and 5th ave.	"	"	90	32	7	"	2.25
101st st. and 5th ave.	"	"	90	30	7.5	"	1.5
99th st. and 5th ave.	"	"	90	30	7.5	"	1.5
97th st. and 5th ave.	"	"	90	31	7	"	1.75
94th st. and 5th ave.	"	"	89.5	35	6.4	"	2.75
82d st. and 5th ave.	"	"	92	16	14	"	.....
Passing Synagogue door.	"	"	92	16	13.8	"	.....
65th st. and 5th ave.	"	N	90	22	10	"	.....
67th st. and 5th ave.	"	"	89.5	26	8.5	"	2
69th st. and 5th ave.	"	"	89	32	7	"	2
Passing Lenox Library.	"	"	90	24	9.8	"	.....
Passing Synagogue door.	"	"	90	22	9.5	"	.....
82d st. and 5th ave.	"	"	90	23	10	"	.....
87th st. and 5th ave.	"	"	89	32	7	"	2.5
110th st., bet. Lenox and 7th aves.	"	W	90	27	7	M	slight up
107th st. and 8th ave.	"	S	89.5	32	7	A	2.5
106th st. and 8th ave.	"	"	89.5	31	7.2	"	2.4
98th st. and 8th ave.	"	"	90	27	8.3	"	2.5
96th st. and 8th ave.	"	"	90	27	8.3	"	2.5
93d st. and 8th ave.	"	"	90	26	8.3	"	2.5
77th st. and 8th ave.	"	"	90	20	12	"	slight down
65th st. and 5th ave.	"	N	90	22	10	"	.....
* Voltage began to drop here. Ground covered to here a little over 20 miles. Time in motion a little over 2 hrs.							
68th st. and 5th ave.	Going	N	86	32	6.2	"	2.5
Passing Lenox Library.	"	"	87	24	8.5	"	.....
Passing Synagogue door.	"	"	87	25	8.5	"	.....
79th st. and 5th ave.	"	"	87	24	8.5	"	.....
84th st. and 5th ave.	"	"	87	24	9	"	.....
87th st. and 5th ave.	"	"	86	36	6.6	"	2.5
110th st., bet. Lenox and 7th aves.	"	W	87	28	7	M	slight up

Location of Vehicle When Reading was Taken.	Voltmeter Reading.	Ammeter Reading.	Speed in Miles Per Hour.	Kind of Pavement Traveling Over.	Per Cent Grade at Point of Reading.
98th st. and 8th ave ..... " S	87	26	6.8	A	2.5
95th st. and 8th ave ..... " "	87	26	8.2	"	2.5
87th st. and 8th ave ..... " "	89	18	10	"	slight down
76th st. and 8th ave ..... " "	88	19	11.4	"	.....
Passing San Remo. ..... " "	88	19.5	11.4	"	.....
65th st. and 8th ave ..... " "	89	16	14.2	"	slight down
55th st. and 5th ave ..... " "	87	27	7.8	"	1
53d st. and 5th ave ..... " "	87	26	7.8	"	1
40th st. and 5th ave ..... " "	87	20	9.8	"	.....

Ground covered to here, little over 27 miles. Time in motion a little over 2.8 hrs.

(To be continued.)

REFLECTIONS OF AN AUTOMOBILE

I am the automobile,
And I run
My never tiring course
Along the roadways
Of the world,
And leave no hoofprints
In the sands of time.
I am the horse's Juggernaut,
Likewise the mule's,
And over their recumbent necks
My whirling wheels
Pass to an era
Not for them.
They mark a step in progress
Through six thousand years;
I leap the bounds
Of all the past
And whiz into the future with
A swish that marks me here
This instant and the next
A thousand years ahead.
I stand, a pioneer,
Upon the lofty ridge
Between the new and old.
And backward down the Kismet path
I hear the slow, increasing tread
Of hoofbeats moving to the field
Of desuetude.
I look before and see
A million multiples of me
Subserving man
In all his moving needs,
A ministrant of motion that
Is measureless as are
Its master's wants.
By night and day I stand and wait,
And at the master's beck
I go.
I have no tired eyelids for
The hand of Sleep
To lay its fingers on;
No hunger gnaws my vitals out;
No muscles, overstrained and sore,
Plead silently for me to rest.
In my new lexicon
There's no such word as rest;
And tireless as may be
The energies of man,
My service meets them everywhere,
And tireless as they,
And makes cessation cowardice.
I am the movement
Of the time to come;
And in me motion finds
Its rhythm and its poesy,
Its "get there"
And its best activity.
I am The Thing;
The It of passage and
The master servant of the master man;
Through the splendor of the future,
In every land and clime,
I will lead the grand procession
Up the corridors of time.
In the niche of transportation
In Pantheon of Fame,
God among the gods of motion,
I shall set my seal and name.

—William J. Lampton, in New York Sun.

Correspondence

(Desiring to make this department of real value, we invite contributions from men who are interested in both the construction and operation of automobiles.)

ABOUT KEROSENE OIL

An interesting contribution to the fund of information concerning oil and oil engines was made at a recent meeting of the New York Railway Club by Mr. John A. Secor. While this was not discussed from the automobile point of view, there were many points of interest to those who are working on the motor problem. Among other things he said:

"Considered solely as a source of power for general use kerosene oil is without a rival. It is obtainable everywhere, at low cost, is safe and possesses the highest thermodynamic value. One pound of ordinary illuminating oil contains three hundred times the energy of one pound of storage battery, is fifty times more powerful than liquid air, and its potential energy is ten times greater than dynamite. As a reservoir of power, one gallon of oil is superior to one ton of storage battery. Ordinary domestic kerosene of 120 degrees Fahr. flash and 150 degrees Fahr. fire test has a specific gravity of about .785, so that a gallon weighs 6.54 pounds and has 135,357 heat units, while an equivalent weight of pure carbon only has 94,830 heat units." Seems like an ideal fuel, doesn't it?

I presume, however, there are objections which will be brought out by the advocates of other sources of power, but the safety and cheapness are certainly two points in its favor.

FRANK C. HUDSON.

Troy, N. Y.

A number of well-known Massachusetts automobilists met in Boston to discuss the formation of a club. It was suggested that the name of the club should be the Automobile Club of Massachusetts. The idea of covering the whole State would give the club much greater influence in the securing of necessary legislation in the improvement of roads and other matters of vital interest to automobile users than if it were simply a local organization. Nothing definite was done, however, in the way of regular organization, although it was fully decided that the club should be formed.

College Automobile Clubs

THERE seems to be a growing desire among students owning automobiles in our larger universities and colleges to form clubs. Columbia College was the first to have such an organization.

Things have proceeded so far as to justify the discussion of an effort to arrange an inter-collegiate automobile meet, in which several of the universities where automobile clubs have been formed will take part. New machines are appearing each day.

Columbia was the first university automobile club to suggest a series of races in which the several universities might enter machines. Considerable difficulty was encountered in securing the sort of track desired, and the scheme has been abandoned for the present season.

The Columbia Automobile Club was formed last January by six undergraduates—W. B. Shoemaker, H. R. Worthington, L. Iselin, C. A. Dana, H. W. Shoemaker and E. L. Tinker. The club at present has twenty-five members, including Professor F. Remsen Hutton and T. F. Kemp, of the Columbia Engineering Department. All members of the club are expected to own or be part owners of a motor vehicle. There are twelve gasoline and ten electric machines owned by the members of the club.

In case the scheme to have a university automobile meet is carried out Columbia will ask the clubs recently formed at Harvard, Yale, Princeton and the University of Chicago to co-operate and make the affair a success. The Columbia Club members have been responsible for the erection of supply stations along the Boston Post Road and at several points along the Jersey coast where the good roads attract owners of automobiles.

Automobilism in Europe

A STATEMENT is made in a consular report that 30,000 automobiles are owned in the Paris consular district. It will be noticed from a perusal of the reports printed elsewhere in this issue that the progress of the automobile in Germany and England is distinctly slower than in France. Probably this is less to be wondered at in the case of England than of Britisher which is peculiarly averse to radically new departures, and as the more general introduction of the automobile over there

would mean the disappearance of the much-liked dray horse, it is not heralded with much favor. This same spirit is true to a greater or lesser extent of a great many of the older nations.

It is rather significant that, according to the reports printed, some of the European countries are waiting the time when America will produce the final automobile and bring it to the same degree of excellence that it did the bicycle.

Starting Motors

THE following, taken from a letter addressed to *La France Automobile,* may interest some of our readers: "I wish to describe a simple method of starting a tube-ignited motor. The inconvenience of doing this with an engine having high compression and the danger of personal damage from occasional back firing are too well known for me to dwell upon here. Having in view the easy starting of motors fitted with electric ignition when the spark is retarded, I have endeavored to apply this principle to motors provided with tube ignition, and have obtained excellent results by two methods. The first, which is more theoretical than practical, consists in moving the burners so that they will only heat the extreme ends of the platinum tubes and so retard the firing. The second method, which is much simpler and quite practical, is by closing the petrol tap governing the supply of petrol to the burners to such an extent that the tubes are only brought to a dull red by the flame, which equally brings about late firing. With the tubes in this condition the motor will start at the first revolution of the starting handle without back firing. No variation of the carburation is required to start a motor under the last-mentioned conditions. The exact heat of the tubes under which the motor will start best is easily discovered after a few experiments. It will be found to vary with the compression."

Change of Name of the Essex County Automobile Club

AT a meeting held at the residence of Winthrop Scaritt, No. 44 Munn avenue, East Orange, October 18, the name of the Essex County Automobile Club, organized at the

residence of Kirk Brown, in Montclair, about six weeks ago, was changed to the Automobile Club of New Jersey.

When the club was first organized it had eighteen members. It now has thirty. The officers are: President, Kirk Brown, of Montclair; Vice-President, W. J. Stewart, Newark; Secretary, Dr. Henry Power, of Montclair; Treasurer, H. W. Whipple, of East Orange. Mr. Brown organized the Central Wheelmen of Philadelphia, and he is confident that a strong automobile club can be organized in this section.

The object of the organization is to secure legislation for good roads and to use its influence to prevent any legislation being enacted which would be detrimental to those who ride the horseless vehicles. The club will be connected with the Automobile Club of America as a sort of New Jersey representative, and several of the members of that organization have already signified their intention of becoming associate members of the New Jersey club. The next meeting will be held on Wednesday, November 14.

Annual Meeting of the Automobile Club of America

THE first annual meeting of the Automobile Club of America was held on the evening of Monday, October 22, at its headquarters, Waldorf-Astoria, New York City. Perhaps a brief account of the beginning and subsequent growth of the club may be of interest at this time.

From a start made by three men in May, 1899, which culminated October 16 in an organization with less than 100 members, the rolls now show 262 active members, affiliations with seven foreign organizations, more than $20,000 in the treasury and a record of many events and of much practical work toward improved legislation. The meeting was attended by fifty-six members, that being the total vote cast. The ticket offered by the Nominating Committee had been modified by the submission of a new ticket, in which A. C. Bostwick was named in place of Gen. G. M. Smith for First Vice-President, Jefferson Seligman in place of Winslow E. Buzby, Malcolm W. Ford in place of Whitney Lyon and Sydney Dillon Ripley and J. M. Ceballos in place of A. C. Bostwick and C. P. Doelger for two of the three governors. The head of the ticket, the Second and Third Vice-

Presidents and Dave H. Morris, as a governor, were indorsed by the opposition. The election resulted as follows:

President, Albert R. Shattuck; First Vice-President, Albert C. Bostwick; Second Vice-President, J. Dunbar Wright; Third Vice-President, David Wolfe Bishop; Treasurer, Jefferson Seligman; Secretary, Malcolm W. Ford; Governors, Class of 1903, Dave H. Morris, Sydney Dillon Ripley and J. M. Ceballos.

An amendment to the by-laws, making it possible for members of the Board of Governors to indorse an application for membership, was adopted by a vote of 49 to 7. The report of Secretary Homer W. Hedge showed that there had been 271 members taken in and a number of resignations, leaving 262 active members on the rolls and 14 honorary. The Treasurer's report showed: Receipts, $26,516.27; disbursements, $5,429.30; balance, $21,086.97. The report of the Exposition Committee showed that $19,916, from rental of spaces and programme privileges, would be in hand before the exhibition opened, insuring a profit of more than $2,000, exclusive of gate receipts. The House Committee reported that no new quarters had been selected and that matter will be left to the new Board of Governors.

The Law Committee reported that it had appealed to Secretary of the Treasury Gage for a new construction of the chapter of the United States Revised Statutes that the Inspector-General interpreted as prohibitive of automobiles carrying gasoline going on ferry boats. Secretary Gage recommended the club to go before Congress with an amended statute. It was also recommended by the Law Committee that an effort be made to have all parkways and drives opened to motor vehicles; that an effort be made to secure the repeal of the old statute requiring a signal man to precede a steam carriage by an eighth of a mile, and also that a movement be begun toward a reciprocal law that would make an engineer's license granted in one city good in any other. The sentiment of several committees expressed was against road racing without a special permit and cautionary as to speeding in the streets.

When President Shattuck took the chair he was loudly applauded. He said that he believed in an aggressive policy, including competitions, an improved library, constant work for good roads and new and more commodious club-rooms. The members thought it inconvenient to be compelled to empty their gasoline tanks when going on a ferry boat.

Among some of those present were the following: H. A. Interman, E. V. Macey, G. H. Macy, E. T. Birdsall, F. C. Armstrong, N. J. Studwell, R. T. Gibbs, H. L. Magee, J. R. Wester-

field, M. S. Eustice, S. C. Bowen, F. B. Cochrane, R. N. Niles, A. W. Butler, R. A. C. Smith, C. J. Field, W. A. Hall, J. C. McCoy, T. C. Martin, G. F. Chamberlin, A. R. Hawley, H. W. Hedge, E. C. Chamberlin, j. C. Church, A. C. Bostwick, C. E. Corrigan, J. F. McClean, Whitney Lyon, R. G. Dubois, E. L. Powers, A. L. Riker, G. B. Berckmans, D. Pierson, Dr. S. S. Wheeler, G. B. Smith, A. H. Whiting, A. B. Mohler, J. M. Ceballos, J. Seligman, J. M. Hill, W. H. Johnson, A. R. Shattuck, E. A. Willard, W. E. Buzby, J. R. Hegeman, J. M. Fish, W. K. Bird and J. B. Walker.

National Automobile and Sportsman's Exhibition

THIS exhibition, which is to be opened in Washington, D. C., Monday, December 10, promises to be one of the most interesting features of the centennial celebration of the establishment of the seat of government in the District of Columbia. It will be the first automobile show to be held at the national capital, which city, by reason of its wide streets and miles and miles of asphalt pavement and level highways radiating from the city in all directions, is particularly well adapted to the use of motor-driven vehicles.

The show will continue for one week and will be held in Convention Hall, a massive building containing within its walls 36,000 square feet of space without a single column. This hall, besides being located in the centre of the city and accessible by various lines of transportation, is admirably adapted to the purposes of an exhibition. It will be so divided as to provide for one hundred and ten exhibition spaces, and an eight-lap track, 16 feet in width, will also be constructed in the building for the purpose of demonstrating the advantages of the various vehicles on exhibition. The exhibition spaces will be located both inside and outside the track, which will also be used for a series of races each evening of the exhibition.

The proposed exhibition will give intending purchasers an opportunity to examine and compare side by side motor vehicles of all types, to see them tested in competition with each other, and enable them to secure reliable and trustworthy information on the various points connected with the operation and maintenance of an automobile.

Notes from London

By Our Special Correspondent, Louis J. Oates

LONDON, October 13, 1900.

LONDON is beginning to recover from the turmoil of a general election, in which the automobile in one shape or another has played a very interesting part. It is no exaggeration to state that fully 50 per cent. of the candidates in the metropolis have availed themselves of its use. Every description of car has been seen out, from the very lightest build up to the heavy dray. Indeed, in Battersea, a purely working class constituency, scores of hardy toilers drove to the polling booths in an immense motor wagon, which had been placed at the disposal of Mr. Garton, the Conservative candidate, by one of his supporters. They seemed to relish the novelty, and the competition for this method of traveling was keen. Further afield, Mr. Leicester Harmsworth, who was returned for Caithness (Scotland), made good use of his 12 horse-power Daimler, and on the last day of his election traveled no less than 160 miles. His car is said to be one of the fastest in England, and can attain a speed of 40 miles an hour. Mr. Harmsworth considers that his success in a great measure has been owing to the ease in which he has been able to canvass scattered districts, and there is no doubt that the automobile has revolutionized canvassing in this remote part of Scotland.

Mr. Joseph Pennell, whose enthusiasm for motor bicycling is well known to all of us, contributes a very interesting article to the *Daily Chronicle,* from which I append a few extracts. He says:

"I have driven my motor bicycle at the rate of 4 or 5 miles an hour through Piccadilly, Pall Mall, Hyde Park Corner and Charing Cross, on a busy afternoon, with a feeling of greater security than on an ordinary safety, because I could put my feet on the ground. The bicycle parts, though extremely strong, are not of the best quality and finish, and the pedals and cranks are far too near the ground. Several times I have hit stones. But all motor bicycles should be built like the Werner—so low that the driver can put his feet on the ground in case of an emergency. The rider of a motor bicycle must also be a good rider of a cycle. The power to steer, to keep one's head when driving at a high rate of speed, to avoid obstructions in the road, will only come naturally to a good cyclist. On the other hand there is some disadvantage, because the experienced cyclist tries to put on the

brake and back-pedal instead of switching off the electric current. But whatever your training as a cyclist, you must understand these motors, while endless patience is required to drive them. Once you have mastered the details, however, the fascination of driving this almost human thing is intense, and a few weeks' practice should enable anyone to do what I have done, and to make longer journeys. On other forms of motors I have been troubled with vibration, owing to the motor being behind or under me. On this machine I have experienced nothing of the sort. The only physical drawback is the number of burns, blisters, scratches and bruises on my hands, from which, like any other person who works with machinery, I seem to suffer. If you are willing to study the motor bicycle I see absolutely no reason why you should not learn to drive it. But it is a very different thing from riding an ordinary safety. Within three or four years I am certain that some sort of motor will be affixed to every bicycle, if only to be used uphill, against the wind, and when the rider is tired. I am perfectly prepared, however, to find the makers of all motor cars, tricycles and quadricycles in opposition to me. But then, scarcely any of the owners of these machines have driven a motor bicycle, and as for the makers—well, a 3 horse-power voiturette may cost £200 ($1,000), while a 2½ horse-power bicycle, which is now being made in England, may cost £50 ($250); but this, of course, has nothing to do with the prejudice of the manufacturers of motor cars against motor bicycles. The motor bicycle is as sure of setting the fashion as the Rover safety was, and it will add as much to the pleasure and comfort of the world as the development of the safety and the pneumatic tire."

You will no doubt remember the recent charge made against the Earl of Carnarvon for furious driving. The evidence would suggest that autocarists have nothing to hope from the prejudices of policemen, who manufacture a case, apparently, after many rehearsals. In the present instance the solicitor for the defence made a point that the evidence was trumped up, and he had strong grounds, for the Police Superintendent admitted that he had given instructions for the police to disguise themselves in plain clothes and post themselves at certain points likely to be passed by his lordship. It also came out in the evidence that the times said to have been noted by the officers, and upon which the speed of the car was determined, were taken upon ordinary watches, none of which were stop watches, or possessed of a centre second hand—altogether unsuitable and useless for such a purpose. Moreover, the course selected for the test was a narrow, hilly

country lane, with several sharp turnings, which the Superintendent admitted could not be taken safely at more than 6 miles an hour on a bicycle without dashing into the hedge. Yet he stated, and the wiseacres on the bench believed him, that the Earl drove his car safely round these bends at four times that speed! It is to be noted further that the timing was done from a bicycle saddle as the car passed a point at a considerable distance from the time-taking policeman. What would the experienced time-keepers of the Automobile Club or the National Cyclists' Union say to this? Nor are the above facts quite the worst in this glaring travesty of justice. Kingsclere, where the occurrence took place, is a very small country town, having no railway station and a small population, and after the case had been decided, it was discovered that a statement to the effect that Lord Carnarvon's car had covered a mile in two and a half minutes had been widely circulated. This report appears to have reached everybody's ears, and long before the case came on for hearing it was common talk, and there can be no doubt that the magistrates who tried the case were somewhat affected by it. The sooner the law of the land is administered by legally-trained stipendiaries, and not country justices, the better. The police, primed with the idea that the Earl had been driving his car at over 12 miles an hour, and having no direct evidence, straightaway set to work to ensnare him. The case is just as bad as it can be from an automobilist's point of view, or, for that matter, from that of any fair-minded person.

Echoes of the Automobile Club's recent tour still reach me, and the journey was interesting in every respect. Monmouth is an ideal locality and the choice was no doubt popular with every one. Lord Llangaltock was a host in every sense of the word, and everybody enjoyed the outing immensely.

Last Sunday a friend of mine, while strolling in Hyde Park, observed no less than fourteen motor cars. In two cases the drivers were of the fair sex, and they handled their respective charges with the greatest skill and workmanship. Will " motoring " become as popular with the fair sex as cycling?

Just a word about the motor omnibuses which run between Victoria and King's Cross. They strike the average man in the street as being clumsy and altogether too noisy. Why cannot electricity be made the motive power? The success of the new Tube Railway shows at once how popular an electric omnibus would become. We are still waiting in patience in London for some American *philanthropist* to reorganize our underground railway system.

A Providential Encounter

(Permission of Harper & Bros.)

Items of Interest

(Readers will confer a favor upon the editors of this magazine by sending in any interesting item of news suitable for this department.)

A trade union of automobile employees has been formed in France known as the "Federation des Chauffeurs, Conducteurs, Mecaniciens Automobilists de France." The union meets three times per week to discuss things of interest to automobile employees.

Mlle. Marguerite Cassini, niece of the Russian Ambassador to the United States, is about the only woman in the diplomatic corps who manages her own vehicle. She may be seen riding around Washington almost any time of the day.

Rome, Italy, is to have a squad of motor vehicle policemen.

The City Engineer of Chicago, Ill., who is a member of the examining board for automobiles, declares that he has heard of so many cases of lady operators without licenses that he intends to ask the authorities to order his officers to arrest all the lady automobilists who have not the necessary badge.

Messrs. O. W. Ramsay and W. C. Wagner, traveling salesmen for a St. Louis wholesale house, have just returned to that city, having covered 1,000 miles through a mountainous section in an automobile.

The trip, made as an experiment, was so successful that both men have decided to go over their territory in automobiles after this year. They are perhaps the first salesmen in this country to use the automobile instead of the railroad to cover a territory in rural districts, where the roads are so bad that they are impassable for wagons in some places. Certainly they are the first men in Missouri to invade the country towns in the horseless carriage.

Mr. H. M. Brinckerhoff, Secretary of Chicago Automobile Club, informs us that after a number of changes the club has settled down on a substantial basis with a membership of forty-eight. The officers of the club are as follows:

Mr. Arthur J. Eddy, President; Mr. J. Ogden Armour, First Vice-President; Mr. Samuel Insull, Second Vice-President; Mr. F. C. Donald, Third Vice-President; Dr. D. Cottrell, Treasurer; Mr. H. M. Brinckerhoff, Secretary.

In the early days of the bicycle, repair shops sprang up all over the country and filled a great need, especially in country places. It is interesting that scattered here and there, especially in the neighborhood of good roads, one sees the sign "Automobile Machinist." It is probable that they will not be as numerous as bicycle repair shops, but certainly it ought to prove a very successful occupation when run by competent mechanics.

Automobile risks are attracting the attention of underwriters of accident policies in the United States, and the fire hazards are creating considerable interest abroad. Some serious losses have resulted from the destruction of motor carriages. A writer in an insurance journal gives a number of recent instances of considerable loss occasioned by automobile fires.

It is interesting to note in connection with the statements set forth in the above paragraph that the number of fires resulting from careless handling of motor vehicles is gradually decreasing, and will continue to do so as the automobile comes to be more generally used.

While discussing the relative merits of steam, gasoline and electric driven motor vehicles, a well-known automobilist of this city, who is the owner of an electric vehicle, informed a representative of this magazine that he had driven his carriage a distance of twenty-five thousand miles, in covering which distance the vehicle had only once broken down, which happened when just about a quarter of a mile from his home. This speaks well, certainly, for the electric vehicle in question.

C. G. Wridgeway, engineer of the De Dion-Bouton Motorette Company, Brooklyn, N. Y., has recently been awarded, by the Chicago *Inter-Ocean* a special championship gold medal for his run of 1,600 miles with a motorette on a trip from New York to Chicago in record time and without accident.

Automobile Club Directory

Under this heading we shall keep a record of the motor vehicle clubs both of this and other countries, and we hope to have the co-operation of club officers in making it accurate and complete.

Automobile Club of America, Malcolm W. Ford, Secretary, 203 Broadway, New York; representative on International Racing Board, Clarence Grey Dinsmore; Substitute, John H. Flagler.

Automobile Club of Baltimore. W. W. Donaldson. Secretary, 872 Park Avenue, Baltimore.

Automobile Club of Columbus, O., C. M. Chittenden, Secretary, Broad Street.

Chicago Automobile Club, Secretary, H. M. Brinkerhoff, Monadnock Block, Chicago.

Cleveland Automobile Club, L. H. Rogers, Secretary, Cleveland, O.

North Jersey Automobile Club, E. T. Bell, Jr., Secretary, Paterson, N. J.

Automobile Club of Rochester, Frederick Sager, Secretary, 66 East Avenue, Rochester, N. Y.

Philadelphia Automobile Club, Frank C. Lewin, Secretary, Hotel Flanders, Philadelphia, Pa.

San Francisco Automobile Club, B. L. Ryder, Secretary, San Francisco, Cal.

Columbia College Automobile Club, Lewis Iselin. Secretary, Columbia College, New York, N. Y.

Buffalo Automobile Club, George S. Metcalf, Secretary, Buffalo, N. Y.

Western Automobile Association, Chicago, Charles T. Jeffery, Secretary, Monadnock Building.

AUSTRIA.

Budapest—Magyar Automobil Club, 31 Musem Korül.

Innesbruck—Tiroles Automobil Club, Rudolph-Strasse 3.

Prague—Prager Automobil Club.

BELGIUM.

Antwerp—Automobile Club Anversoir, 34 r. Longue de l'Hopital; President, Baron de Bieberstein.

Brussels—Automobile Club de Belgique, 14 Pl. Royale; Moto-Club de Belgique, 152 Boul. du Nord; Touring Club de Belgique, 11 r. des Vauniers.

Charleroi—Automobile Club de Charleroi, Hotel de Esperance.

Ghent—Automobile Club de Flandres.

Liege—Automobile Club, Liegeois, 2 r. Hamal.

FRANCE.

Amiens—Automobile Club de Picardie, 36 r. de La Hotoie.

Avignon—Automobile Club de Avignon.

Bordeaux—L'Automobile Bordelais.

Dijon—Automobile Club, Bourguignors Cafe Americanie.

Lyon—Bicycle et Automobile Club de Lyon; Motor Club de Lyon, 3 pl. de la Bouise.

Marseilles—Automobile Club de Marseilles, 61 r. St. Fereol.

Nance—Automobile Club, Lorrain, Thiers pl.

Nice—Automobile Velo, Club de Nice, 16 r. Chauvain.

Paris—Automobile Club of France, 6 pl. de la Concorde; Motr-Club de France; Touring Club de France, 5 r. Coq-Héron.

Pau—Automobile Club, Bearnais Ave. de la Pau, President, M. W. K. Thorn.

Périgueux—Veloce Club, Perigourdin, Hôtel de Commerce.

Toulouse—Automobile Club, Toulousain Café Riche, pl. St. Etienne Société des Chaffeurs du Midi, 25 r. Roquelaine. President, M. Gay.

GERMANY.

Aachen (Aix la Chapelle)—Westdeutscher Automobile Club, Hotel Grand Monarque.

Berlin — Mitteleuropaischer Motor Wagen Verein, I. Universitatstrasse, Herr A. Klose; Deutscher Automobil Club, Luisenstrasse, 43-44.

Dresden—Radfahrer-und Automobilisten Vereinigung; Dresdener Touren Club.

Eisenach—Mitteldeutscher Automobil Club; Motorfahrer Club, Eisenach.

Frankfort am Main — Frankfurter Automobil Club, Restaurant Kaiserhof.

Munich—Bayer. Automobil Club, 33 Findling Strasse.

Stettin—Erster Stettiner Bicycle und Automobil Club.

Strassburg—Strassburger Automobil Club.

Stuttgart — Suddeutscher Automobil Club; Wurtembergischer Motor Wagen Verein.

GREAT BRITAIN.

Birmingham—Motor and Cycle Trades Club, Corporation street.

Edinburgh—Scottish Automobile Club.

Liverpool—Liverpool Self-propelled Traffic Association, Colquitt street. Secretary, E. Shrapnell Smith.

London—Automobile Club of Great Britain and Ireland, 4 Whitehall Court, S. W. Hon. Secretary, C. Harrington Moore.

HOLLAND.

Nimegue—Nederlandsche Automobile Club.

ITALY.

Milan—Club Automobilisti Italiani 6 via Guilini.

Turin—Automobile Club d'Italie Via Vittorio Amedeo II, 26.

RUSSIA.

Moscow—Moskauer Automobile Club, Petrowka, Hauschnow.

St. Petersburg—Automobile Club de Russe, President, M. Delorme.

SPAIN.

Madrid—Automobile Club de Madrid.

SWITZERLAND.

Geneva—Automobile Clu de Suisse, 9 boul. de Theatre.

AN ALMOST PERFECT AUTOMOBILE

Mr. Persimmons McAllister Steele
Built a magnificent automobile;
The seat was as big as a Dutch feather bed,
With pillows a-plenty to hold up his head;
He'd an organ to play, if he felt so inclined,
And a nice little kitchen was hitched on behind,
Where a servant could cook him a pretty fair meal.
"I go in for comfort," said P. McA. Steele.

There were cupboards and closets and boxes and hooks
And a fine cosy corner, where Steele kept his books;
Below was a water tank where he could swim
(For bathing appealed very strongly to him);
He had a roof garden on top of the thing,
Composed of chrysanthemums set in a ring;
And then everybody began for to feel
A sort of contempt for P. McA. Steele.

For when he got in and yelled out, "Clear the track!"
The machine could be moved neither forward nor back;
"I've forgotten," he cried, in a voice full of woe,
"To put in the motor that should cause it to go;
But I really don't care—it is safer by far,
For I cannot run into a wagon or car."
So he happily lives in his automobile,
Does Mr. Persimmons McAllister Steele. —*Exchange.*

Automobile Exhibit at Madison Square Garden

IN point of magnitude, uniqueness and attraction the exhibition held under the auspices of the Automobile Club of America will eclipse everything of a similar nature which has preceded it, and that it will not fail in its object is evidenced by the great interest evinced in it.

So far as size is concerned it may be said that there will be motor vehicles of every kind there. These comprise all makes, styles and prices. It is a collection of the best this country could produce and a picture of American intelligence and genius.

It would be difficult for anyone to walk around viewing the various machines exhibited without feeling justly proud of the intelligent workmanship that rested behind them.

This is all the more creditable when we stop to consider that, in perhaps the majority of cases, the designing of many of the motors and parts was carried on without very much having been done previously. In other words, the designers have proceeded on entirely original lines, the industry being rather too young to afford much to fall back upon.

The contests will be such as to thoroughly bring out the weaknesses of machines in various spots.

The usefulness of the automobile in all kinds of going and under all conditions will be fully tested, and everybody will have an opportunity to see how the experienced *chauffeur* gets out of his troubles. All the contests but those on Friday, November 9, will be for vehicles in the show, and the programme, under the directions of the Technical Committee and the Contests and Exhibition Committee of the Automobile Club of America, of which Mr. Cornelius J. Field is chairman. The contests will be as follows:

Afternoon contests begin at 4 o'clock; evening contests begin at 9 o'clock.

Saturday, November 3—Evening, 45 minutes, obstacle contest for steam vehicles.

Monday, November 5—Afternoon, 45 minutes, brake contest for electric vehicles; evening, 45 minutes, obstacle contest for electric vehicles.

Tuesday, November 6—Afternoon, 45 minutes, brake contest

for gasoline vehicles; evening, 45 minutes, obstacle contest for gasoline vehicles.

Wednesday, November 7—Afternoon, 45 minutes, brake contest for steam vehicles; evening, 45 minutes, obstacle for steam vehicles.

Thursday, November 8—Afternoon, 45 minutes, brake contest for electric vehicles; evening, 45 minutes, obstacle contest for electric vehicles.

Friday, November 9—Afternoon, 45 minutes, obstacle contest between operators of electric cabs for hire, also stopping contest; evening, 45 minutes, competition of electric delivery wagons, obstacle contest and stopping competition.

Saturday, November 10—Afternoon, 45 minutes, championship competition and obstacle contest between winners in steam, electric and gasoline; evening, 45 minutes, championship between winners of stopping competition in steam, electric and gasoline.

It may be of interest to some to know how the contests are to be conducted. In the obstacle races barrels, ten pins, etc., are to be put at certain places, and the vehicle going through them and around them in the fastest time without knocking any over wins. If none succeeds in doing this, then the machine which knocks down the fewest number wins. Should a vehicle knock over a certain number, but covers the distance in fast time, and some other vehicle knocks fewer down in comparatively slower time, they will be pitted against each other.

In the braking contests each vehicle will travel at a certain speed and the one sliding the shortest distance after receiving the word to brake wins. This contest will call for unusually fine judgment to keep the carriage going at sufficient speed to make comparisons valuable. This will be controlled by timers stationed at places toward the end of the distance to be traversed.

The vehicles will be started on the opposite side of the track from where brakes will be applied, and thus be able to gather momentum. When well under way the timer will start his watch and say 100 feet further on another timer will stop his. Then, before the competitor has time to do anything to interfere with the momentum, word will be given him to brake, the judge marking the place where word was given. The finish can, of course, easily be seen.

In addition to the exhibition of new machines there will be a number of foreign carriages shown by members of the Automobile Club of America. A. C. Bostwick will exhibit his new Panhard & Levassor carriage, a very fast machine, having 24 horse-power; D. Wolfe Bishop will show his 16 horse-power

carriage of the same make; S. T. Davis, Jr., a steam racing carriage; A. L. Riker, an electric racing carriage, and Alex. Winton, a gasoline racing carriage. Besides the vehicles on exhibition, the makers will have stored at the east end of the Garden between fifty and seventy-five carriages, which will be run on the track, and it is the intention of the management to have from twenty to twenty-five carriages moving on the track at all times during the show, except when competitions are on.

Some of the makers of the horseless carriage will show as many as a dozen vehicles, ranging in price from $500 to $3,000, and in their finish they will vie with the best carriages ever turned out. The show will give intending purchasers an opportunity to see more styles within a short time than ever before, and it will also give the general public an opportunity to see the coming carriage and convert them to the idea that a means of conveyance has come that is equalled by none other.

The Waltham Manufacturing Company, Waltham, Mass., who will occupy an entire block of space, section "J," at the northeast corner of the Garden, will have an exhibit which will attract more than ordinary attention.

The exhibit is to be a complete and varied one, consisting as it will of motor bicycles, autogos, runabouts and victoriettes. The prices on these range from $280 to $1,500. The motive power of each is the French Aster gasoline motor, for which the company has the American agency, and is prepared to supply complete, with all accessories for attaching to any vehicle.

The Orient autogo, in the three-wheel model, has, during the past season, shown its superiority over French and American racing machines by winning most of the events and making new world's records at the Automobile Exposition at the Fair at St. Louis and at the Chicago tournament. The autogo which made the world's records and which was ridden by Albert Champion, will occupy a place in the exhibit, and is sure to be an object of much interest.

The wonderful work of the tandems and tricycles is sufficient proof, so the Waltham people claim, of the superiority of the French Aster motor combined with the Orient cycle construction, over competition the world over.

The Orient autogo was the first vehicle of this sort to be made in this country, and is the product of French ingenuity linked with the best American mechanism. Easily handled, it represents a style of motor vehicle destined to become popular. The four-wheel Orient autogo provides for companionship by

supporting on the forward wheels an upholstered seat poised on elliptical springs. The speed of the four-wheeler can be governed from 5 to 15 miles an hour, with a speed of 20 miles under the best conditions. The three-wheel Orient autogo can be governed to a speed of from 6 to 20 miles per hour, and, under the best conditions, 25 miles, at an expense of a quarter cent the mile.

The Orient motor bicycle and Orient autogos comprise a line distinct by itself, of interest more particularly, perhaps, to the cycling enthusiast who has graduated from the push and whose

Motor Tricycle of the Waltham Manufacturing Company

enthusiasm has commenced to drift towards the self-propelled vehicle. Apart from these is the line of automobiles for pleasure and business.

Two models will be shown. The Orient runabout, designed for either business man or pleasure seeker, is the medium price automobile of the Orient line, and in the entire show nothing can be seen that is superior for the money. Upholstered in leather or whipcord, fitted with 3¼ horse-power water-cooled motor.

The Orient victoriette is extremely graceful in appearance,

altogether different from the existing ideas in designs. The motive power is ingeniously concealed without resorting to boxy expedients. Its lightness renders high speed and hill climbing easy. It has a double seat, with a substantial covered top. In place of the usual dash is a single auxiliary seat. The running gears are painted bright in contrast with the highly polished black body. It is fitted with a 3½ horse-power Aster motor, with a range of speed from 3 to 18 miles an hour.

We present three illustrations of vehicles exhibited by the Waverley Company, of Indianapolis.

The frames of each of these vehicles are made of cold drawn,

Waltham Manufacturing Company's "Victoriette"

seamless tubing, with forged brayed connections. The front axle also is of tubular construction, the engagement with frame permitting oscillation around ring bolt, and so equalizing on uneven surfaces.

On these machines powerful band brakes are fitted, which are actuated by foot levers. Auxiliary brakes are also fitted for use in sections where the country is hilly.

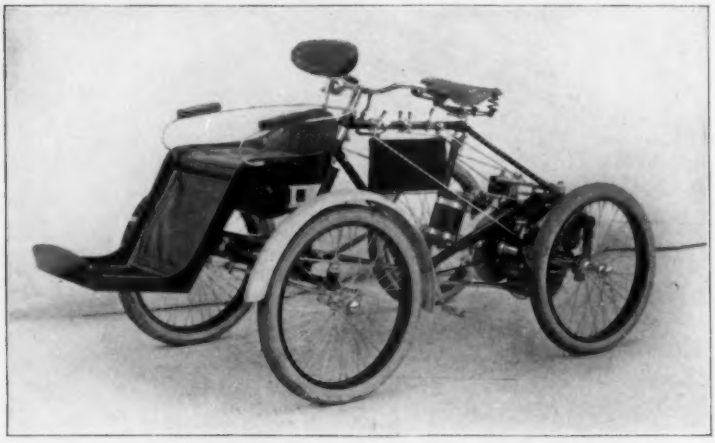
The motor is of the multipolar, ironclad type, being dust-proof and self-oiling. Single reduction gearing connects it with the rear wheels. This gearing is inclosed in a dust-proof case.

Steering is accomplished through a ball-bearing mechanism, a lever for this purpose being placed at the operator's right hand.

It is especially desirable that there be some method of making it impossible for any but the driver to start the machine, as serious accidents might otherwise occur. On the Waverley carriages there is fitted a lock rendering it impossible for anyone but the driver to operate the vehicle.

The delivery wagon is fitted with a special wheel and screw steering system. The bodies of all the carriages present a neat and graceful appearance.

The " Victor " automobile shown is made by the Overman Automobile Company, of Chicopee, Mass. It is a steam machine,



Waltham Manufacturing Company's Quadricycle

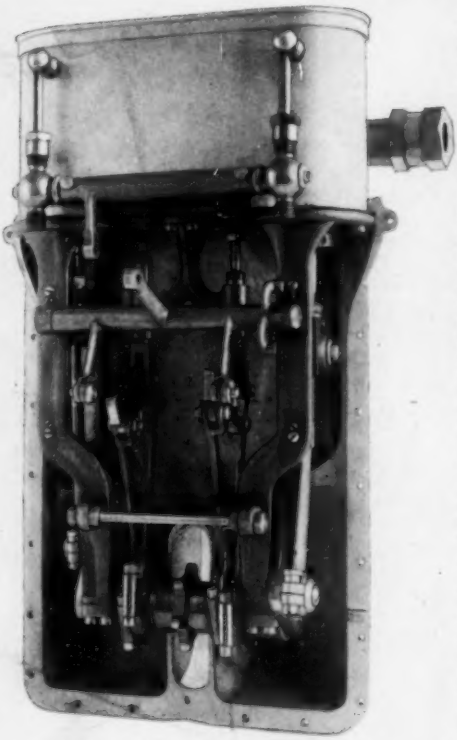
with automatic water and fuel feeding arrangements. The depth of water in the boiler is regulated automatically by a device that cannot get out of order, no floats nor similar devices being used. It is so arranged that it will always supply water to the boiler on level ground or when going down hill, and will supply water while the carriage is going up hill if the hill is very long, but it will do it then when needed.

By means of a lock the opening of the throttle when the driver's seat is unoccupied is impossible, and prevents the wagon being started through carelessness or mischief on the part of passersby when the wagon is standing. It practically locks the machine until the driver is seated.

Automobile Exhibit at Madison Square Garden

It is claimed by the builders that with cold water in the tank, 150 pounds steam pressure in the boiler is obtained within ten minutes after starting the fire. Every part of the carriage is made of metal except the seat and footboard.

The engine, which is placed in the body of carriage, is inclosed within an aluminum case. This is partly filled with oil.



Engine of the "Victor" Automobile

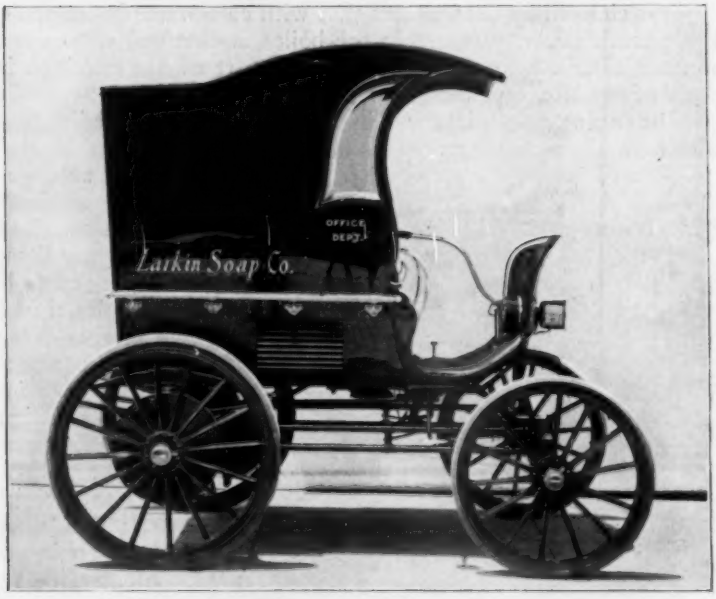
The general arrangement of the working parts will be seen from the accompanying illustration. The case is made of aluminum and is in two pieces. This makes a very compact piece of work and insures entire freedom from the annoyances caused by dirt and dust getting into the working parts. The fuel tank holds a sufficient quantity of gasoline to supply the burner while traveling a distance of from 50 to 60 miles.

John T. Robinson & Co., of Hyde Park, Mass., exhibited two carriages similar to the one illustrated, the other not having any top.

The carriage shown is made to accommodate two persons, including the driver.

The body is hung entirely separate from the engine truck. In these carriages two styles of bodies are furnished—a stanhope with victoria top and open stanhope with spindle seat. As will be seen from pictures, there is ample room provided for the passengers.

The Upton steering gear is used on these vehicles, which is made dust and dirt proof. This gear gives two speeds forward



Waverley Delivery Wagon

Waverley Electric Brake

Automobile Exhibit at Madison Square Garden

The Robinson Gasoline Carriage

Stanley Carriage with Canopy Top

and a reverse. Lubrication is effected by means of one grease cup, with capacity for 100 miles.

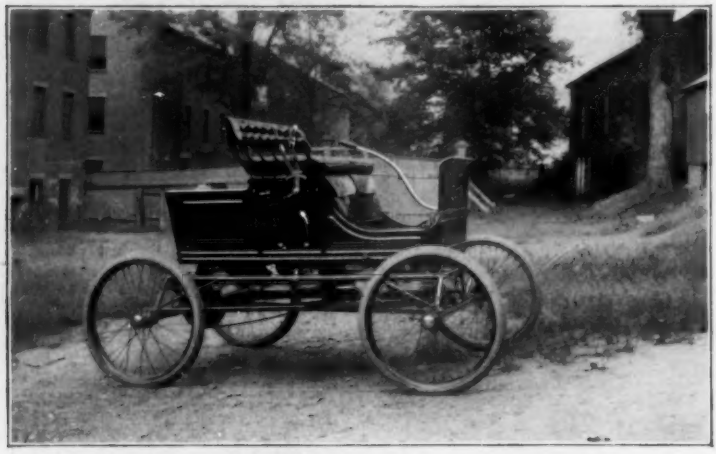
The engine has two cylinders, each of 4-inch by 6-inch stroke, and is so arranged as to make all parts easy of access and readily adjusted.

The wheels are fitted with 3 and 4 inch pneumatic tires. Roller bearings are used throughout.

The tank will carry sufficient gasoline to take the vehicle 100 miles.

The best material has been used throughout its construction.

We present illustration of one of a number of carriages



The "Victor" Automobile

exhibited by the Stanley Manufacturing Company, of Boston, Mass.

This is an open carriage provided with a canopy top.

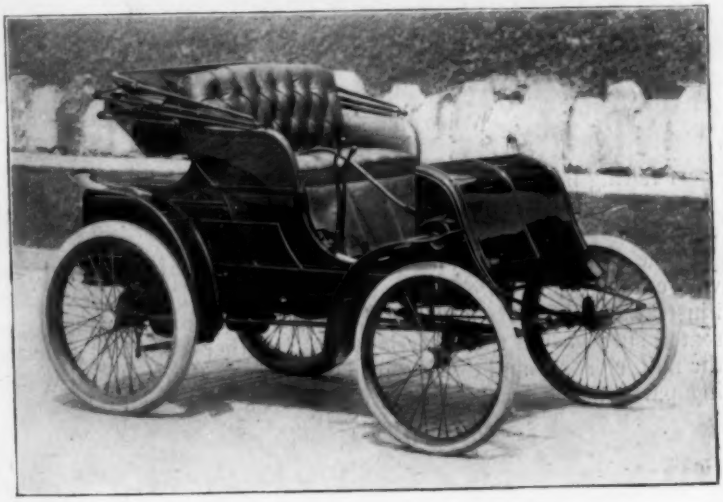
This carriage, when loaded with water and gasoline, weighs about 1,600 pounds.

A tubular boiler is used, the steam being generated by means of a gasoline flame. The engine used is of the compound type, with high and low pressure cylinders, which the builders claim has shown an increase of economy over the single type of engine of from 25 to 30 per cent.

Steering is accomplished by means of a handle bar which is conveniently placed in front of driver. This is moved to the

Automobile Exhibit at Madison Square Garden

Waverley Stanhope



Winton Two Passenger Carriage

right or left in order to guide the carriage in any desired direction.

In order to reverse the engine a lever is placed at the right hand of operator, which moves over a notched quadrant and is fitted with a locking bolt, which holds the lever in the desired position.

The boiler is made of firebox boiler steel, with copper tubes, and is built under the inspection of the Hartford Steam Boiler Inspection and Insurance Company.

Winton Two Seated Surrey

Braking is performed by a double powerful brake.

Ten or twelve miles an hour is the ordinary speed of the carriage.

The exhibit of the Winton Motor Company, of Cleveland, O., was extensive, but we illustrate only two of their styles. The illustrations show respectively their one-seated carriage and two-seated surrey. In these carriages, as in other Winton products, the motor proper and driving mechanism, together with all working parts, are concealed in the body of the carriage and so pro-

tected from dust and dirt. The motor is of single cylinder type and operates with hydro-carbon gas, generated from gasoline vapor and air.

Considerable objection has been raised to the exhaust from gasoline motors. In order to overcome this these vehicles are fitted with a " muffler," which takes proper care of the exhaust. This muffler is used only on Winton vehicles.

The gasoline tank is of sufficient capacity to permit operation from 80 to 100 miles. It will hold 4½ gallons.

The wheels are of bicycle construction, with 3/16-inch steel

The Auto-Car Company's Carriage

spokes, the rear wheel having 56, while the front wheel has 40 spokes respectively. Ball or roller bearings are used.

These vehicles have given great satisfaction, especially to users in hilly districts, where the service has been severe.

The company intends to exhibit a new carriage, however, which while possessing the essential features of the present vehicle will in many respects be much more desirable and have some decidedly new things about it.

The Locomobile Company of America will have a complete exhibit of various styles of carriage, though it was not possible for us to get ready for this article the necessary illustrations. The

space occupied by the company will be the largest individual one in the Garden.

The styles of Locomobile delivery wagons to be shown are as follows: Locomobiles, styles No. 2, No. 02, No. 3, No. 03, No. 003, No. 0003; Locoracer, style No. 4; Locosurrey, styles No. 5 and No. 05; Locodelivery; Locotruck.

All the vehicles shown by the company will be attractively decorated.

The carriages exhibited by the Autocar Company, of Ardmore, Pa., were of types similar to that illustrated.

These vehicles are equipped with a two-cylinder motor, of the "Otto" type, which is rated at 5 horse-power, although by actual brake test these motors are giving as much as 5 8-10 horse-power. The cylinders are horizontal and set opposite each other, the crank shaft being at an angle of 180 degrees. The valves, cylinders and heads are all water-jacketed, water being forced through the cylinders and radiator by means of a centrifugal pump attached to the motor shaft. The speed of the motor is varied from 240 to 1,000 revolutions per minute. Thus it will be seen that a complicated speed mechanism is not necessary. The transmission device is a very compact one, and there are but two gears in mesh at a time. Power is transmitted from the secondary shaft to the rear axle by means of chain and sprocket. The rear sprocket is attached to a small pinion, which in turn drives a larger one, mounted on the compensating gear. The compensating gear and rear axle, as well as the pinion, are all encased, thus keeping out dirt and dust, and run in a bath of oil.

The frame of the vehicle is set very low, and all attachments are mounted on the side bars of the running gear, so that various shapes of bodies can be placed on the standard running gear without interfering in any way with the motor or transmission.

The company is making centre steering and side steering devices for controlling the front wheels. One lever, which is located on the side of the seat, controls the entire mechanism. The transmission device has two speeds forward and one reverse. The slow speed, or low gear of the transmission, will drive this carriage up any ordinary grades at a speed of from 10 to 12 miles per hour. The high speed gear, with the motor running at its maximum speed, will give from 18 to 20 miles per hour, and by simply changing the lever attached to the motor from one notch to another, the speed of the vehicle can be increased up to 30 miles per hour, if necessary.

The radiating system of this carriage is a special feature, inas-

much as two, three to four gallons of water is sufficient to keep the engine cool for an indefinite time. The water is pumped from a small can in the rear of the vehicle through the engine and from the engine through the radiating can, which is placed in such a position under the foot board, or in front of the carriage, where the greatest possible amount of air will be obtained. In this way the water is kept down below the temperature of boiling point. Wire wheels, with pneumatic tires, are employed.

All parts of this vehicle are made interchangeable, by the use of automatic machinery.

The Cunningham Engineering Company, of Boston, makers of steam wagons and power transmission devices, were among the exhibitors. The wagons made by this firm are of three sizes, one to carry 3 tons, another 6 tons, while the largest size is constructed to transport 8 tons.

The Cunningham Company believed that the motive power should be applied to the wheels carrying the greatest burden when the vehicle is light and that power applied to all the wheels will be more effective, because of the increased traction.

As a result of experiments carried on by the company a chain gear transmission device has been designed which is applied to forward and rear axles alike, hydraulic clutches being introduced into both forward and rear connections, enabling the operator to apply or release the power from one or both axles at will.

The brake used on those wagons consist of an upper and lower friction clamp which grips the surfaces of the outer shells of the clutches.

The Electric Vehicle Company's exhibit will include 18 Columbia automobiles showing the different styles of pleasure, transportation and business vehicles, consisting of the following types: Phaeton, tricycles (one with jaunting car seats, one standard), gasoline runabout, eleven-passenger wagonette, delivery wagon, six-passenger omnibus, eight-passenger omnibus, runabout, victorias (one to have English canopy top, one to have hood), straight front brougham, extension front brougham, surrey, Gabriolet, delivery wagon, rear-boot victoria, hansom.

We have not space at our disposal to show all the machines and can only therefore illustrate three of them, while we must confine ourselves to mere descriptions of some of the other exhibits.

The Columbia phaeton is one of the best known and most popular styles of automobiles built by the company. They have delivered to their customers over two hundred, of which number sixty have been shipped to Paris. The finish is in shades of dark

green, and every detail of both finish and trimming is of the highest class obtainable. The wheels are wooden with heavy pneumatic tires and are mounted on ball-bearings, as are the other moving parts. The third seat at the rear, or rumble, makes provision for a groom or other attendant. If desired, however, this seat may be removed and the tail-board shut up. The mileage capacity on one charge of the batteries supplied as standard is thirty. The speeds are three, six and twelve miles per hour.

The runabout has been a great favorite from the time it was first offered. They are in use in all the large eastern cities, and in San Francisco, Denver, St. Louis, Chicago and Mexico. The spring suspension is remarkably easy. The mileage capacity is

Columbia Cabriolet

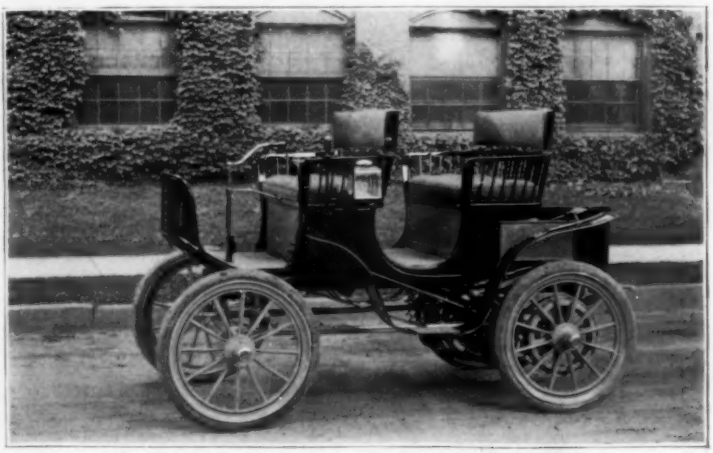
twenty-six on one charge of the batteries, and its speed up to thirteen and one-half miles per hour.

The Columbia Victoria has graceful lines, and the light running qualities of this little vehicle make it an especial favorite. The main side panel is finished in automobile red, the battery compartment being black. It can be furnished with a hood or English canopy top, as an extra, when specified. The long wheel base and easy spring suspension are noteworthy features. Its mileage capacity on one charge is twenty-six, and it gives speeds up to thirteen and one-half miles per hour.

The Columbia Rear-boot Victoria is one of the latest styles

offered by this company. The rear seat provides room for a driver and a "tiger," while the broad passenger seat gives comfortable room for two occupants. The upper panel in the seat is finished in light yellow French cane work, and the lower panel in a dark green, and a remarkably smart effect is the result. The mileage capacity on one charge of the batteries is twenty-five. The speeds are three, six and twelve miles per hour.

The Columbia Cabriolet follows the general lines of the comfortable horse-drawn vehicles of this style, which are so largely used in Paris, and in recent years have become so popular for calling and general driving in this country. On one charge of the batteries its capacity is twenty-five miles and its speed is twelve miles an hour.



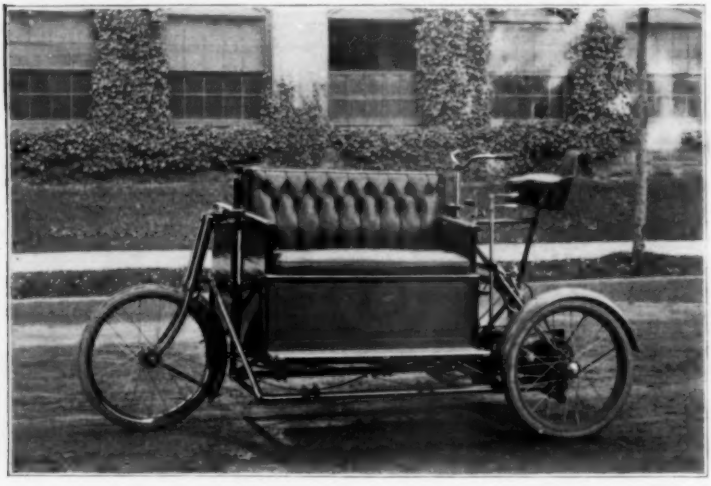
Columbia Surrey

The Columbia Surrey is one of the most recent productions of the Electric Vehicle Company, although a few have been in use since the latter part of August. It comfortably accommodates four occupants, and can be equipped, when specified, as an extra, with a canopy top. Its mileage capacity one one charge of the batteries is twenty-five. Its speeds are three, six and twelve miles per hour.

The Columbia Broughams are built with straight fronts and extension fronts. The former style accommodates two passengers, the latter four, in addition to the driver and attendant on the front seat in each case. For theatre service, for calling and

for physicians' work, they are largely used. They attain a speed of eleven miles an hour and the mileage capacity is twenty-five on one charge.

The Columbia Hansom is one of the earliest types of public automobile vehicles put on the market by the Electric Vehicle Company, and was the first to become a familiar sight in the streets of our large cities. It has the well-known advantages of the horse-drawn hansom, with the added one of having the view from the front of the vehicle entirely unobstructed. It is in steady demand for all public vehicle purposes and more than three hundred are in use. It has a mileage capacity of twenty-five and attains a speed of eleven miles an hour.



Columbia Tricycle with Jaunting Car Seats

The Columbia Six-Passenger Omnibus was designed especially as an opera bus, and has been very well received. Among the many automobiles shown by the Electric Vehicle Company at the Paris 1900 Exposition, this was the subject of especially favorable comment. It will be recalled that the Electric Vehicle Company was placed *hors concours* at Paris on account of its representative being one of the members of the jury. A similar honor was accorded only to one or two of the leading French manufacturers. Its mileage capacity on one charge is twenty-five and its speed ten miles an hour.

Automobile Exhibit at Madison Square Garden

The Columbia Wagonette is the largest automobile, as regards passenger carrying capacity, which has yet been placed on the market in numbers as a standard vehicle by any automobile firm. It takes eleven people besides the driver without any crowding. For public service and pleasure excursions of any nature, they are largely used, and are also giving excellent satisfaction in the former class of work in different cities. One charge suffices for twenty-five miles and a speed of ten miles an hour can be attained.

The Columbia Gasoline Tricycle Carrier has been found to fill an especial demand for a delivery automobile capable of carrying light weights at a high speed over considerable distances. It will take merchandise up to 500 pounds besides the driver, and can be run at a speed of over twelve miles per hour. One charge of the gasoline tank suffices for seventy-five miles, and the water tank needs refilling after each run of twenty. This vehicle can also be equipped with seats running lengthwise, thereby transforming it into a species of jaunting car. It is claimed to be the simplest and most economical gasoline delivery automobile now on the market.

The small Columbia Delivery Wagon has been only recently offered. It will carry a load of 600 pounds besides the driver and attendant, and has ample bulk capacity for florists, laundries and other establishments dealing in merchandise of similar character. It is good for a mileage on one charge of the batteries of twenty-five, and its highest speed is eleven miles per hour.

The other Columbia Delivery Wagon exhibited is the well-known type of electric wagon turned out by the Columbia Company, over ninety of which are now in use in different localities. It will carry up to 1,000 pounds of merchandise, besides two occupants on the front seat. It is good for a mileage on one charge of the batteries of over twenty-five and speeds up to eleven miles per hour.

The Holyoke Automobile Company, whose works are at Holyoke, Mass., will show one of their cross-country touring surreys at the Madison Square Garden Exhibition. The Holyoke carriages are driven by gasoline engines and differ materially in construction from the majority of automobiles. There is no countershaft running and no gearing except for extreme hills. The body of the carriage does not carry any of the machinery.

The running gear of the carriage consists of a frame of heavy channel irons; having pivoted at its forward end a front axle, so that the wheels may follow the inequalities of the road without straining the frame. The rear axle is carried in a pair of bronze yokes, which allow of its removal by unbolting the yoke bars and

break rods and loosening the chains. The engine is carried in its own frame, which is supported on transoms on the running gear. The engine frame carries the clutches and their mechanism so that they may be removed as one piece from the engine by loosening a few bolts. The channel iron frame is supported on the rear axle by coiled springs inside the yokes, so that the engine, which is a two-cyinder vertical one, completely water-jacketed, is spring supported, and the jolting of the road reduced to a minimum. No carbureter is used, but a special mixing device, which is unusually perfect, and does not require adjustment. The ignition is electrical and of the make and break type, the current

Cross Country Touring Surrey of the Holyoke Automobile Company

being supplied by a dynamo driven from the engine, the dynamo also furnishing current for the side lights. A small battery is employed for starting, which is exceedingly easy, a half turn of the crank being usually sufficient; the relief valves on the engine reducing the muscular effort to a minimum by destroying the compression during starting. The clutches are unusually large, being a foot in diameter. They are carried directly on the engine shaft and are contained within the fly wheels, of which they form a part. The high speed gear and the medium speed are both taken directly from the engine shaft by a direct chain drive by means of the two clutches. There is thus no gearing in use the

greater part of the time, as the medium speed will ascend a 10 per cent. grade on a good road. For extreme hills and for backing gearing is employed which is driven from the medium speed clutch. All the gearing is contained on the back axle and is removable with it.

The carriage body is carried directly on the axles by double elliptic springs and has no other connection with the running gear except the clutch and break rods. Two powerful band brakes are applied to the rear axle. They will stop the carriage within 75 feet without shock or jar, going down a 5 per cent. grade at a speed of 25 miles an hour. The steering is done by means of a screw which renders the wheels irreversible and prevents the transmission of heavy shocks from the rod to the steering handle. So perfect is this device that a gutter has been jumped at a speed of 25 miles an hour, with hands off, without altering the course of the carriage in the least.

The company's latest type of body is an all-metal one, designed with the special reference to the accessibility of the machinery and to carrying luggage. The side, front, back and top of the seat are all made removable by the use of a small key. In front is a large, hollow dash board for carrying mackintoshes and other light luggage, while on the phaeton and runabout type there is provided a place in back of the seat for carrying a suit case or two. In the surrey storage space is under the front seat. The only difference between the surrey and phaeton is in the body; the running gears and engines are the same. The bodies are interchangeable. A speed of 25 miles an hour on good, level roads is attained, and 5 miles an hour on 20 per cent. grades. The speed of the engine is controlled with a throttle, by which the speed of the carriage may be varied from 7 to 25 miles an hour, with the high-speed clutch in use. The carriages carry fuel supply for 150 miles of ordinary roads and water sufficient for 50 miles.

These carriages are essentially for heavy touring work and cross-country runs. They are built more on the lines of a Pullman car than of a light speed wagon, and have been subjected to some severe tests to prove their durability. It is not considered that weight is any objection where needed to gain strength and durability, as the engines are well able to take care of all the load they have to pull.

The St. Louis Motor Carriage Company, St. Louis, Mo., exhibited two vehicles, both of which are illustrated.

The runabout is without the top and sells for $1,000. Is fitted with latest style of single cylinder self-contained motor.

All gearing and speed changes are in the base of the engine, fitted throughout with ring oilers, making frequent attention unnecessary. But one friction clutch is used. The lever which operates this clutch and the lever which operates the speed changes interlock by a patent interlocking system which makes it absolutely impossible to strip the gearings by mishandling. When the vehicle is moving the only thing the operator can do is to release the clutch and throw on the brake in case he becomes confused for any reason. The tanks for cooling are on the side, where they get all the passing breezes.

The trap is built to carry four passengers, with a rear seat

St. Louis Motor Carriage Company's Runabout with Buggy Top

which folds out of sight when not in use. This is fitted with a double cylinder motor of larger power than the runabout.

The De Dion-Bouton Motorette Company, who are the American representatives, sole agents and licensed manufacturers of the De Dion-Bouton Company, of Puteaux, France, whose reputation is world wide as the most successful manufacturers of the lighter types of motor carriages called motorettes or voiturettes, also motor cycles, including tricycles and quadricycles, will make their bow to the American public with a full line of their different types of motor cycles and motorettes.

This company was organized only a few months ago, and has

established their works in South Brooklyn, at the corner of Thirty-seventh street and Church lane, where they have practically unlimited facilities for the turning out of their products, and the motorettes to be exhibited at the Garden will be the first product of the factory.

The De Dion-Bouton Company, of Puteaux, France, are the original inventors, patentees and developers of a very successful hydro-carbon or gasoline system of the lighter class of vehicles of this type, and practically every first-class manufacturer in England, France and Germany use motors of the De Dion-Bouton Company's make in connection with their motor cycles and motorettes.

St. Louis Motor Carriage Company's Trap

The American De Dion-Bouton Motorette Company is therefore in a position to furnish the American public for the first time with a successful, practical and thoroughly tried and perfected hydro-carbon or gasoline system of motorettes and motor cycles, and the cordial reception, indorsement and large amount of business that has already been received by them shows the appreciation on the part of the American public of the success of this well-known system.

The exhibit of the De Dion-Bouton Motorette Company will be found on the left-hand side of the Madison Square Garden, in the left corner.

The company is presenting for the inspection of the public four different samples or types of their New York motorette, each one having some special modifications or typical features, illustrations of which are shown herewith. This motorette certainly presents to the public the most desirable type of general motor carriage or motorette for all-around use. They are intended for general pleasure purposes and use in the city and country in touring, and are built to operate at a fair rate of speed, up to a maximum of 25 miles per hour, which is believed to be all

New York Type "Motorette" of the De Dion-Bouton Motorette Company

that is desirable for pleasure purposes. Another very attractive modification of the New York motorette is a surrey operated from the front seat, with a hood or top over the rear seat. Where long rides are desired, and where parties object to riding backwards, this modification of their standard motorette is certainly a very desirable one. Another type of New York motorette which certainly will attract special attention, particularly from the doctors and for use around the city for calls and going out

evenings, is the doctor's brougham, which is operated from the inside and holds two passengers.

The company also shows a design of a gasoline hansom cab which they are building, but which it was unable to complete in time for the Exhibition. This certainly is going to fill a long looked for want in a practical commercial cab for hiring or for commercial purposes, to be operated by a *chauffeur*.

Coming to the next general type brought out by the Motorette Company we find a very attractive, natty little Brooklyn type for two passengers. This carriage certainly is one of the best little

Brooklyn Type "Motorette" of the De Dion-Bouton Motorette Company

two-passenger runabouts for all-around purposes. The capacity of the motor is sufficient to take the vehicle up ordinary grades. We learn that quite a number of the officers and members of the Automobile Club of America, as well as of other automobile clubs in different cities, have ordered from the Motorette Company motorettes of the New York and Brooklyn types.

Three different types of motor quadricycles are shown. These types of motor cycles are the most popular type in Europe of all those manufactured, and the Motorette Company believes that when the American public comes to a full realization of the pleas-

ures and touring capacity of these little quadricycles in place of bicycles, there will be a large demand for the same.

They also have a new type of unconvertable quadricycle, which will be put on the market next Spring. This latter machine is equipped with a very powerful motor and is expected that it will be a favorite with the American riders. They also show several types of motor tricycles.

In the special exhibit of the Motorette Company, in connection with the special exhibit of the Automobile Club of America, is shown the high-power racing tricycle, which is equipped with a

Motor Tricycle of the De Dion-Bouton Motorette Company

special 7 horse-power motor, which is capable of a speed of 50 miles per hour. This machine won the 900-mile Paris-Toulouse Race in France a few months ago.

In this special exhibit is also shown a New York type of motorette which has a record of over 7,000 miles run the last year, and is in perfect running condition to-day, which shows no appreciable amount of wear as result of its service. The last trip of this motorette was a 1,600-mile run to the Chicago Automobile Contest.

Automobile Exhibit at Madison Square Garden

In addition to this, the company is showing a special high power type of New York motorette, used by Mr. C. J. Field, Vice-President and General Manager of the company for touring purposes, with an extra high speed and capacity over the New York type No. 1, capable of operating at a speed of 35 miles per hour.

The Motorette Company will have two motorettes for a practical demonstration on the track and outside the Garden for those who desire to make a trial of them.

The Haynes-Apperson Company will have three carriages on exhibition, each one interesting. The double seat or four-passenger carriage is equipped with an 8 horse-power double cylinder engine. This company has a special form of automobile engines which were designed by them early in 1894. Its cylinders are arranged on opposite sides of the crank shaft, the cranks being arranged to avoid vibration. They use three forward speeds and one backward.

The speed changes are all controlled by one lever, so that the management of the carriages is entirely controlled by the two levers. The regulation and the flexibility of their engines are controlled by a throttle, the same as in a steam engine, and the speed of the engine is as sensitive to the throttle as in a steam engine. The gasoline is fed to the vaporizors through metal piping and is controlled by a float. The proper mixture of gasoline and air is secured at all times, whether a light or heavy charge is used. The valves for controlling the mixture are operated by a foot lever conveniently located in the floor of the carriage. By controlling the size of the charge the impulses of the engine are regular, whether under light or heavy load, thereby reducing the vibration to a minimum. Their vehicles are all fitted with large pneumatic tires of a special construction. They use an improved roller chain, which is also of their own design and made especially for their use by the Baldwin Chain Company.

Flexible roller bearings are used in its axles, their steering arrangement is of original design and their frame construction has many patented features.

The Automobile Which the Public Wants

MUCH time and attention is being given to the racing automobile at present. Undoubtedly this feature of the motor vehicle is useful for certain purposes, but the generality of people are not looking for racers, but a reliable, serviceable carriage. In this connection it may interest some to read a short paragraph which appeared in a recent issue of the Providence *Journal*. It said:

"Many newspaper writers, well informed on most of the topics discussed by them, gravely describe the automobile capable of a rate of thirty or forty miles an hour as 'the perfect motor vehicle.' Those who have had practical experience know that the 'perfect automobile' must have other recommendations. Capacity for speed is by no means the most important requirement. A vehicle which will average ten or twelve miles an hour ten hours a day for three hundred days without expensive repairs when operated by a person of ordinary judgment may properly be considered 'perfect.' As yet no builder has produced a mechanically driven carriage which has successfully withstood such a test. Excessive speed on city streets and country roads is neither desirable nor safe, and record-breaking runs have only one good feature—they show weakness in construction and errors in design more quickly than trips made at moderate rates of speed and thus enable manufacturers promptly to correct miscalculations as to the strains caused by jolting over rough highways."

Book Review

"Horseless Vehicles, Automobiles and Motor Cycles," by Gardner D. Hiscox, published by Norman W. Henley & Co., No. 132 Nassau street, New York; price, $3.00. This book opens with an historical account of the motor vehicle industry, accompanied by a number of illustrations of early carriages. There are chapters devoted, respectively, to vehicles using steam, gasoline and electric motors. The book contains numerous illustrations of the different forms of carriages now in use, and ought to prove of value to those interested in the construction and practical manipulation of automobiles generally.

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THE AUTOMOBILE FROM A COMMERCIAL POINT OF VIEW

ON another page of this issue we reprint the first part of an article by Mr. Fliess, in which he views the automobile industry from a commercial viewpoint, and it is probable that his article could not have appeared at a more opportune time.

At present there are doubtless many persons of means who have serious thoughts of investing money in automobile enterprises. The question which naturally is uppermost in the minds of such people is, "How long will the fad of automobilism last?" Of course, as it now stands the automobile is largely used as a pastime by the majority of private individuals. One reason for this is undoubtedly the high price asked for them, while at the same time it is true that not a few physicians have already put money into them for professional service.

Editorial

Apart from the pleasure of automobiling as a pastime, it would be very difficult for one to visit our large cities and observe in how many ways the motor vehicle is used without feeling convinced that it had already become and will continue to be more and more an important factor in the social and commercial life of our country. It is because of the automobile's practical utility in these two very important phases of our relations one with the other that leads us to have settled convictions in the soundness of the industry and its ultimate development.

It would be well, however, for those who contemplate the investing of money in automobile enterprises, to go very slowly. In the case of new fields of work, such as the automobile, what is new to-day may be antiquated to-morrow.

There can be little doubt but that there will be a great demand for that style of motor vehicle which will displace the horse in actual service. None of the machines so far placed on the market are all that could be desired, but it is reasonable to expect that at no very distant time the " carriage of the future " will make its appearance.

The Final Automobile

IN the October issue we published the first of this series on the practical construction of automobiles. That paper dealt with the bearings, and under the title of " Permanent Bearings " gave the result of Mr. Dolnar's long experience in that direction. The present issue takes up " Location of Motor and Power Transmitting Elements," while the remainder will deal with Clutches—Fuels and Combustion—Motor Framing—and Wagon Framing and Wheels—in the order named.

While the title may sound ultra-positive on the part of the author, his practical experience gives weight to his arguments, and he is proving his faith in the conclusions given by investing many thousand dollars in a machine which depends largely on the truth of these principles for its success.

Automobile Show at Grand Central Palace

THE list of exhibitors at the automobile show to be held at Grand Central Palace, November 14 to 24, will include a large number of those who exhibited at the Garden.

It occurs, not during the warmest political week of the whole campaign, but after the turmoils of election are over and when things have resumed their normal routine, which ought to be in its favor.

The Palace show has the advantage of occurring during the Horse Show week, when more than 50,000 out-of-town visitors are here taking that show in.

The Cooke Locomotive and Machine Company will exhibit a truck with a carrying capacity of 3½ tons, 17 feet 6 inches long and 8 feet 6 inches extreme width across platform. This will be the first time this truck has been exhibited in the United States—in fact it is the first truck to be constructed in this country under the patents of the Thornycroft Steam Wagon Company, of England. It has been in satisfactory operation for the past three months.

It is expected that the whole exhibiting space will be taken before the show opens. There are now, however, a number of desirable spaces vacant. Full particulars may be obtained by addressing Marcus Nathan, Manager, Grand Central Palace, New York.

The Final Automobile

Hugh Dolnar

II.—Motor Location and Power Transmission Elements

CUGNOT began automobile construction with a pair of oscilating steam cylinders in front, and his use of the oscilator was followed in a solitary instance, shown at the Times-Herald 1895 Chicago Automobile Exhibition. This Chicago wagon had an oscilating cylinder on each side, 2-inch bore by 12-inch stroke, with direct independent spur gearing to the independent rear drivers, and a Scotch boiler, fired by

plumber's gasoline torches, under the wagon seat, and resembled Cugnot's venture in not making nearly enough steam to supply the cylinders. Dr. Gurney, Hancok and Dance placed their steam cylinders in various positions, always close to the boiler. Dr. Gurney invented the water tube boiler, and Hancock used a pair of double acting steam cylinders secured to his vertical internally fired boiler, and working downward on a crank shaft carrying two sprockets chain connected to the rear driving wheels. Period, 1825 to 1837, say. Then the partisans of the "Hay Motor" triumphed until the '90s. With the revival of the use of steam on common roads in England, nothing could suit the fine conservative tastes of the English wagon designers except the placing of a little hoisting engine on the wagon platform, usually in front, fancy and invention being strictly forbidden in all respectable English engineering circles.

Daimler, when he found his little pleasure route gas motor driven railway line a success, made wagons with two or four vertical or slightly inclined internal combustion trunk cylinders placed both in the rear and front of the vehicle, and so was first in those types. Benz was a quick follower with a single horizontal gas driven cylinder, Otto cycle, and, of necessity, a heavy flywheel. The various French makers of road wagons have commonly preferred vertical internal combustion motors, placed between the front and rear axles. Except in a single instance there is as yet no established type of motor wagon for use on common roads.

In the first paper of this series an attempt was made to show that a permanent bearing, requiring neither lubrication nor attention for many days together, might be produced. If such a bearing can be found it is very clear that it must be rigidly supported by the motor and wagon framing to obtain the full measure of its possible advantages. It is money thrown away to build costly ball bearings having only a very small clearance, unless they can be made to properly support the journals running in them. Hence the first demand for all the wagon framing members which support moving parts, is rigidity and inflexibility. The degree of rigidity demanded is, however, relative only, and not absolute. As is well known, absolute rigidity of support is extremely difficult to obtain even where deeply sunken foundations of massive masonry are admissible, and an absolutely rigid support for automobile bearings is evidently an absurd requisition, if the bearings are to be distributed in widely separated locations on the wagon frame.

Certainly the very first requirement of the automobile is light-

ness of construction, because every pound of weight must be carried on the pneumatic tires, which should be loaded as lightly as possible, and because every pound of wagon weight must be driven by the motor, and is non-paying load, and so should be reduced to the lowest possible limit. Notwithstanding these manifestly correct weight and lightness assumptions, many automobile builders assert that a much greater weight of wagon than is really needful to carry the motor and the passengers should be given to the wagon, to obtain steadiness of motion while running. George Whitney, who built some eight or ten steam wagons, no two alike, made his first wagon to carry two passengers weigh only 650 pounds, but at the time of the completion of his eighth experimental vehicle he said that a road wagon to carry two passengers should weigh not less than nine or ten hundred pounds, this great excess of weight over the actual load carrying demands of the wagon being needed, as he expressed it, "to make the wagon stay down on the road." The European wagon builders appear to make no special effort to reduce the weights of their vehicles, which are held as light at a thousand or twelve hundred pounds, and run up to fifteen hundred pounds, and a ton, when half the weight would easily and safely carry the paying load; that is, the passengers and the motive elements. Winton, some of whose wagons have given great satisfaction in steady use, makes no particular effort to avoid weight, and builders in general seem to agree substantially with Whitney, that a thousand or twelve hundred pounds of wagon weight is not objectionable. From the standpoint of engineering economics, however, the lighter a wagon of given capacity can be made the better it is, so long as safe load carrying capabilities are secured.

The value of light construction was fully understood by the Stanleys at the outset of their highly successful efforts in steam wagon construction, and at the end of the second year of their work, when they had completely evolved their type of vehicle, now largely produced in the form of the well-known "Locomobile" and the "Mobile," built by two different makers under the Stanley patents, the Stanley wagon for two passengers weighed only about 510 pounds with all supplies aboard, ready for travel. This was with a boiler weighing no less than 95 pounds empty, 4 or 5 gallons of gasoline and 12 gallons of water. The water supply of the Locomobile has been increased now to 20 gallons, making a weight of 160 pounds for this item alone, so that the Locomobile must weigh well toward 700 pounds ready for the road, the increased size and weight of the water tank probably calling for some added weight of wagon framing.

The Stanley wagon when it first appeared was universally condemned by automobile builders at large as being so light and frail in construction as to be certain to go to pieces on the road. Many hundreds of the Stanley wagons, which must now be regarded as the only firmly established type of mechanically driven road vehicles, are in daily use, and fully show that the framing is abundantly strong, and that this lightest of the largely produced automobiles is heavy enough to meet all practical requirements. Since Stanley's work has become so widely known the many imitators thereof have gone away from the original Stanley lines in both directions, making what are in appearance and substance almost exact copies of the Stanley work weighing from 450 pounds to 900 pounds for two-passenger wagons.

Since automobiles are made to weigh from 500 to 3,000 pounds in weight to carry the same load of two passengers and the needful running supplies, it is clear that there is no established practice in wagon weights. As to forms which shall be given to the principal wagon members, there is an equally wide divergence. Wheels are made of wood, with solid rubber tires, and with steel rims and wire suspension spokes, both types finding favor with makers and users as well. Channel iron and tubing are both used for the principal frame members. The "American" electric wagons even went so far as to change from some years of use of steel tube framing to solid steel forgings of substantially rectangular section throughout, claiming that these examples of smithy production are superior in every way to any pieced-up steel tube frame which can be made, although all of the other electric vehicle makers in America, without exception, so far as known to the writer, adhere to the steel tube frame.

While there is as yet no such thing as established practice in wagon wheel or frame construction, the location of the motor, and the choice and location of transmission elements are equally varied and diverse.

If there can be said to be any majority agreement among European automobile makers as to where the motor shall be placed and what devices shall be interposed between the motor and the driving wheels, that agreement appears to be in favor of the Daimler plan which located the motor in the extreme front of the wagon, where the dash-board of the horse-drawn vehicle is placed, with leather belts or gearing from the motor shaft to the counter shaft, and chains from the counter shaft to the driving wheels. Very many constructors leave out the belts, substituting light gearing therefor, either spur or beveled, between the

motor shaft and the counter shaft, and retaining the chains from the counter shaft to the driving wheels.

While there are some apparent advantages in this Daimler arrangement of placing the motor in the extreme front, it has the vast demerit of distributing the transmission elements all through the whole extent of the wagon framing, thus making anything like a rigid support of the moving parts an absolute impossibility. In our American steam wagons Hancock's English arrangement of 1830 has been adopted, the boiler and engines being vertical with chain transmission from the engine crank shaft to the balance gear located directly on the rear driving axle. This makes a very satisfactory arrangement, light, cheap, compact and strong, except for the inherent weakness of the chain, and the stretch of the chain, which is certain to lead to accident if not carefully looked after.

Both chains and belts appear to the writer to be wholly unsuitable for use in motor wagon driving. Belts are more objectionable than chains, as they vary in length with the amount of moisture carried by the atmosphere, and the belt ends cannot be easily or securely fastened together by unskilled hands, while the belt tension needful to secure adhesion to the pulley surface sets up a heavy friction not incident to the use of either chains or gearing.

It is not needful that the advantages gained by locating the motor in front of the driver's seat should be enumerated here, because the great disadvantages of no luggage space and weak machine part support are defects of such grave importance that the front motor is sure to be discarded as soon as wagons are shown which have a large luggage carrying capacity, and give a thoroughly satisfactory support to the motor shaft, the gearing and the driving axle at the point where it takes motion. It is a perfectly easy matter to place as much as nine or ten horsepower of internal combustion motor, with all the tankage needed for a 100-mile run, and all the gearing needful for the "locomotive drive," on one single integral frame of cast metal, either gray iron of some of the aluminum bronzes, without exceeding 300 pounds in weight, or making the whole of this well supported assemblage of motor parts too large to all go comfortably under the rear seat of a four-passenger wagon in such a way that by turning this rear seat upward and backward the whole of the machinery will be fully exposed and readily accessible to the driver in every part, while the driver stands upright on his feet. The writer is now completing a motor which fully meets these conditions, which cannot be patented broadly, and which will

certainly be succeeded by many other wagon motors having the same advantages as to part support and the space occupied.

The term "locomotive drive" is to be understood as meaning a direct drive by gears or chains from the motor shaft to the balance gear on the rear axle, with, of course, a reverse of about the same speed. The speed reduction from the motor shaft to the rear axle may be in any ratio desired, various makers using a two to one, two and a half to one, three to one and four to one reduction of speed between the motor shaft and the rear axle. The Stanley wagons did use two and a half to one reduction with a chain drive, and link valve motion reverse, which simple arrangement at once avoids all clutches, gears and counter shafts, and makes an absolutely silent drive. This "locomotive drive," which may be reasonably expected to be the prevailing type for light passenger work as soon as its great advantages are clearly understood, is in effect precisely the same as the railway locomotive drive, and the first requisite of such a drive is a motor of sufficient power for any hill climbing to be done, as this arrangement does not include speed change gear. Thus the motor cannot be made to vary the rate of the drivers except by varying its own rate of speed, and must run slow when the wagon is required to run slow, and fast when the wagon runs fast. In other words, the wagon must be overpowered so far as level road driving is concerned, and not only overpowered but very largely overpowered, since every wagon must in some way be made capable of giving the drivers four or five times the power needed for fair level road work. These are unfavorable conditions for steam motors, which are large wasters of fuel when worked much below their maximum capacity. The mere fact, however, that all of the millions of tons of load hourly under railway translation are moved by this overpowered system of driving, without changes of gearing other than by shifting the links of the valve motion, shows very conclusively that the overpowered drive has great merits, even where steam is used, and must be regarded as wholly suitable for such small labors as are incident to light road wagon driving; this assertion is also fully proved by the Stanley wagons, which are good hill climbers, although they have no change gears.

The internal combustion motor is in all ways almost precisely the reverse of the steam engine, and since its cylinder does not require to be made hotter than it naturally is, the internal combustion motor can burn small fuel charges and work far below its maximum capacity with very little, if any, waste of fuel. The cylinder fired motor must waste, say, 75 per cent. of the total

power generated by the fuel combustion, in cylinder cooling to insure the motor against speedy self destruction. Hence, as in the Winton and many other wagons, the speed of the vehicle is very readily regulated by charge volume reduction, and if a reducing gear be added for very stiff work in deep mud and sand, the wagon can meet all road requirements in very good form indeed. This type of wagon can also avoid all refinements of construction, and the Winton is one of the very simplest wagons now in use.

The belief and expectation that satisfactory automobiles would be offered to the public which should be of such simple construction as to be readily and well repaired at any village smithy, has passed; the wagon users have discovered that the simple designs are invariably deficient in special functions absolutely essential to satisfactory performance. This, however, does not in any way make it less desirable that all the working parts of the wagon should be so located and arranged as to be easily reached and examined and touched by the driver. Where the motor is placed in front the cover can be removed and inspection of the motor parts so be made easy. The transmission elements must, however, in this case reach from front to rear of the vehicle, so that the parts underneath the wagon, which are quite as likely to require attention as the motor itself, can only be reached by the hand of one who lies on his back underneath, or by having a pit of sufficient depth to permit of standing under the wagon.

Mrs. M. E. Kennard, writing in the *Autocar*, October 6, 1900, well shows the great importance of accessibility of motor parts in the following extract from her story of a tour made with an 8 horse-power "Napier" wagon known as "Sir Charles." A pin had broken off in the cam shaft and the cam shaft would not turn. Mrs. Kennard writes this: "All the next day Brookes and I spent arduous, anxious hours endeavoring to remove the fragment of the broken pin from the hole in which it remained tightly wedged. I could only act as a very humble assistant, whose willingness failed to atone for want of skill. Without a pit, the job was singularly awkward. The base chamber had to be detached, and the fly-wheel stood obstinately in the way of split-pins, bolts and nuts. For two consecutive days Brookes [the "Mechanicien"] spent the greater portion of his time on the flat of his back, wedged beneath the car, while I stood over him with a lighted candle which flickered freely on his upturned face. 'The punch, mum, the large chisel, the big spanner,' he gasped periodically, whilst I hastened to find the desired tools and place them in his hand. Eventually he had to borrow a drill

from the blacksmith, and drill a hole right through the tenacious fragment, before, to our joy, out it fell. Then Brookes inserted a fresh pin, and after awhile replaced the base chamber, governor, etc." Mrs. Kennard goes on with more troubles.

Without commenting on the singular incapacity of Brookes to run the wagon up on some sort of blocking or staging so he could work more at ease, it seems that the design of this much praised " Napier " wagon displays a pitiful poverty of inventive talent and common sense, as well as a lack of elementary knowledge of machine construction. Evidently the " Napier " constructors are not aware of the Woodruff key, or they would never tolerate the use of pins for securing wheels to shafts. Evidently, also, very ordinary skill in machine designing would so dispose the small parts of the motor that they could be easily disassembled. Mrs. Kennard's graphic diction very fully and clearly illustrates the necessity of ready access to the motor parts, and it is really quite surprising that the " Napier " wagon, which is unquestionably the result of much thought, should involve such serious errors of design. But the " Napier " is no worse than other European road wagons, all of them being about equal in general poverty of mechanical construction refinements, in inconvenient arrangement of parts and want of accessibility generally, the more costly wagons being even more faulty in these important particulars than the cheaper constructions, which have fewer parts. The final automobile will certainly have all of its machinery so placed as to be easily inspected, and easily reached, without working overhead in a pit, and without lying on the flat of the back on the ground.

This one requisite of ready access to parts seems to fully warrant unqualified condemnation of the front motor location. Where the motor is placed in front the transmission elements must be underneath the wagon body, and their highly important parts can be reached only by the removal of the wagon body, by the use of a pit, or by crawling under the wagon in the manner of Brookes in Mrs. Kennard's harrowing narrative.

Locating the motor at some point in the rear of the driver's foot-room is even more objectionable than the dashboard position. With the motor in front of the driver all the parts of the motor itself can easily be reached, leaving only the intermediate transmission elements difficult of access. Where the motor is placed under the seat of a two-passenger wagon, as in the De Dion and Stanley wagons, a pit becomes an absolute necessity, and since the pit cannot be carried on the road with the wagon, it is clearly evident that it may not be at hand when most needed.

It is true that parts of the wagon body may be made easily removable, so that access to some of the more frequently manipulated parts of the mechanism may be made easy, and this is done in many instances. The only full and adequate solution of the problem seems, however, very clearly to be found in so compacting the motor with all of its attendant tanks, tubes, batteries and wiring that everything can be carried on a single integral frame at the rear of the vehicle, and so disposing the various parts that they may all be easily seen when the tailboard or rear seat of the wagon is turned up, and arranging the whole so that everything can be seen and reached by the hand of the driver while he stands on his feet. These conditions are partly met in the Benz, Oakman and Winton wagons, more fully, perhaps, in the Oakman than in either of the others named.

Where, as in case of the Stanley type of steam wagons, the machinery and tanks fill all of the wagon body, leaving no unoccupied space whatever, either the pit must be used or the wagon body must be taken off, when it is needful to reach the working parts, one or both.

Designers in general seem to have first of all accepted general accessibility to the mechanism of a motor wagon as an absolute impossibility, and to have resigned themselves to such compromises as might be most readily made, robbing Peter to pay Paul, and never reaching really satisfactory conclusions anywhere. For all this, it is not an impossible task to make the whole of the wagon machinery easily accessible on all occasions and in all locations.

The question of what the transmission elements between the motor shaft and the driving axle or axles should be, is as yet indecisively answered, the only general agreement being that there should be a speed reduction from the motor shaft, no attempts to drive the driving wheels directly by the motor connecting rods having resulted in satisfaction within the writer's knowledge. The railway locomotive pistons are coupled directly to the driving wheels, but if this is attempted in the road wagon the cylinders must be so large in diameter for use at slow speeds as to make it impossible to supply them with steam from a boiler of reasonable dimensions when the wagon is to be rapidly driven. If the intermediate gearing stops at a simple speed reduction from the motor shaft to the driving axle balance gear, it may, as in the Stanley steam wagon type, consist simply of a chain with a small sprocket on the motor shaft and a large sprocket on the balance gear drum. With the non-reversing internal combustion motor a reversing gear must be added, and clutches must be intro-

duced, and it is still deemed desirable by most automobile designers to include in the transmission elements an ideal speed and direction change mechanism, which may be actuated by a single hand lever so as to cause the wagon to run either backward or forward at any rate of speed from zero to the maximum, without varying the speed of the motor shaft. No such speed changing mechanism is known, nor has any near approach to it been made. Dieterich, of Hartford, U. S. Patent 634,327, October 3, 1899, shows a one-direction speed change universal from zero to the maximum, without a friction loss much exceeding that of the best spur gearing, and in his extremely ingenious invention furnishes what appears to be the nearest approach yet made to a correct speed change, but the fact that this elegant mechanism cannot be reversed makes it needful to place it between the motor shaft and a reversing gear leading to the driving axle, if it is to be used with a non-reversing motor. If the speed change is to be made with commonly known devices the designer can choose between direct changes by different sized spur gears and pinions, the ratchet drive, the friction disk and traversing friction driven pinion, the disk sometimes being developed into a hollow sphere, and worm gear and worm mechanisms. The spur gear speed change must have clutches for all the speed variations, and so must the worm gear changes. The friction disk and its modifications are ideal so far as mere action is concerned, since they give all speeds from zero to maximum, in both directions, without clutches, and are absolutely silent in action. These great inherent advantages have caused many experiments to be made with the friction disk and traversing pinion drive. The fact, however, that this drive commonly shows a friction loss not under 35 per cent. of the power, and that the traversing friction pinion is hard to keep up, has caused the general abandonment of this form of speed change for automobile use, often after great money expenditure. Hart, of Poughkeepsie, by placing the traversing pinion between two disks driven in opposite directions has made this disk drive very satisfactory up to the transmission of perhaps as much as one-fifth of a horse-power. In general terms, however, it may be safely asserted that the friction disk and traversing pinion, with the inherent fault of an indeterminate pitch circle, will not do at all for automobile driving. The ratchet drive is universal in both directions, and gives a speed change from zero to maximum, but acts to drive by successive impulses only, not by a continuous action. It is, however, possible to so arrange a ratchet speed change as to give a considerable number of impulses for each revolution of the driving wheels, as many as 32 separate

impulses for each driver revolutions being easily obtained, and as this ratchet speed change is silent, reversible, easily controlled by a single lever, calls for no clutches and wastes very little power in friction, it may yet find a considerable field of use, in spite of its intermittent action. This speed change problem is at present considered to be of great importance in automobile construction, but if the locomotive drive is found sufficient, as it certainly appears to be for all light vehicles, then the demand for the universal speed change disappears.

Having disposed of the speed change question, the designer is next confronted by the problem of transmitting power from the countershaft, or from the motor shaft if no counter shaft is used, to the driving wheels. The balance gear may be applied to the counter shaft, in which case it may be very small and light, the whole arrangement weighing only a few ounces in some of the electric wagons. If the balance gear is placed on the driving axle the axle may be divided, or it may be continuous, with one wheel secured to a sleeve loose on the axle, while the other driving wheel is secured to the axle itself. The balance gear, which should have three pinions, neither more nor less, must then be strong enough to transmit the power at the reduced rear axle speed. The balance gear has but little motion, and really but little work to do, and is not a prolific source of troubles. The transmission to the drivers may be direct, the rear axle being wholly stationary, and it may be made through chains or through spur gears, which may have plain or spiral teeth. Counting all the automobiles now produced, the chain is used much more frequently than the spur gear. A much used plan places a large sprocket directly on each of the driving wheels, thus using two chains from the counter shaft to the drivers. This scheme is extremely faulty, as the two chains never wear equally, and are consequently never of the same length exactly, and so can never both be properly adjusted. The chain has the grave inherent fault of a multitude of moving parts, each subjected to individual wear, and two chains exactly the same length when placed in work will not keep their parity of extent for any length of time, although the work done by each is about the same. A single chain, led to the rear axle carried balance gear drum, makes a much less faulty arrangement than the two chain drive, but in the case of the single chain it is essential that convenient and certain means for taking up the slack of the driving chain should be supplied.

The chain should be as light as is consistent with tensile strength, since the chain life is not dependent on bearing surface

dimensions, and wear increases rapidly with chain weight increase. Very nearly all of the chain wear is caused by the vibration of the slack side of the chain, and is not in any way due to the actual work of power transmission which is performed by the chain. The wear is due to grinding, each link pin and block of an uncovered chain doing road work being liberally supplied with abrasive material. Chains should be covered by a perfectly dust proof casing, which is in all cases a monster of such hideous appearance as to forbid its general adoption. An absolutely dust proof chain case is also difficult of construction, and unless the case is perfectly dust proof it is of little or no use. Hence, although the evils of a grit laden chain are well known, the chain case is very rarely or never applied to the automobile. All of these faults of the chain are, however, counterbalanced by the fact that it will work about as well when the sprockets are a little out of line as if all the parts were exactly where they should be. This makes insufficiently supported working parts act far better with a chain drive than with a spur gear drive, and is probably the real cause for the retention of the chain in road wagon work. With rigid support and perfect bearings, spur gearing, which can be easily inclosed in dust proof casings, is in every way vastly superior to the chain as a power transmitting element, although a clean, well lubricated chain loses less power by friction than a spur gear in equal work. It is, of course, only the merest make-shift engineering which will tolerate the partial alleviation of one set of faulty conditions by the introduction of other elements which must be faulty to be efficient. Yet this is precisely what a great number of automobile constructors are now doing. Working parts are imperfectly supported on flexible frame members, and the many-jointed, mud-collecting, rapidly-wearing chain is brought in because it will work pretty well when the sprockets are considerably out of line.

The only correct way out of all this muddle is to place permanent bearings on rigid framing, use gear transmission exclusively, employing spiral gear teeth in all cases to avoid noise, and inclosing all moving parts in dust proof cases. These conditions have not yet been met in any commercial road wagon construction; it seems beyond doubt, however, that they will be found present in the final automobile, which certainly cannot include constant length variations of important driving members.

Speed on Public Roads

THE question of speed is one which makes itself felt at almost every turn. Leaving aside the racing mechine, built solely for speed and properly for use only on tracks or some special course set apart for them, and we come to the side which is really most important, the speed of road carriages. While it is unnecessary to limit it to the speed of a horse, as there are many places where fifteen and even twenty miles an hour may be safely made on good roads, the question of accidents by collision is an ever present one.

The judgment of the individual driver must be the guide to the proper speed in most cases, but is it desirable to have a maximum speed of over twenty miles an hour for road vehicles? This limit would seem to be satisfactory from nearly every point of view, and would prevent claims of higher speeds being made by antagonistic individuals that seem to abound.

Fast driving on the roads is to be deprecated in most cases, as it is unnecessary, unwise in that it endangers passersby, and makes enemies instead of friends, and is sure to cause undue restrictions on the speed of motor vehicles by local or State laws.

If all users will endeavor to keep the speed of their machine within proper limits, particularly when passing or meeting teams or pedestrians, many of the legal limitations can be avoided. These are often absurd in their restrictions, and it is better to avoid them than to have the trouble of getting them repealed afterwards.

A united effort to refrain from speeding on public roads will have a good effect and prevent many annoyances to the users of motor vehicles of any type.

New Electric Omnibuses for New Haven, Conn.

SOME time ago, in New Haven, Conn., there were placed in service a number of electric omnibuses. After trying them thoroughly it has been decided to remove them, as the experiment has not proved successful. One of the principal faults discovered was the extreme heaviness of the vehicles, each of them weighing three tons, and their operation called for an unusually large amount of power. Their seating capacity was

12 passengers inside and 6 outside. Their speed also was too slow, the maximum being but 8 miles per hour.

The new buses, five in number, have been ordered from the Woods Motor Vehicle Company, of Chicago. Their weight will be one-half that of the present vehicles and their seating capacity will be ten, instead of eight. There will be no roof seat, but the driver's seat will be large enough so that it may accommodate two passengers, besides the driver. They will be geared to be run at a speed of twelve miles per hour if desired. Three of them will be in regular service and the headway will be reduced from fifteen to eight minutes. The other two will be held as reserve vehicles or to let to private parties for trips to points within the city limits. These vehicles will also be equipped with springs which will not render it necessary to depend so much upon the resiliency of the tires.

When talking, a few days ago, with a representative of this journal, a well-known automobilist spoke of the inconvenience sometimes caused by the inability of manufacturers to furnish vehicles in a shorter period than is usually named by them. This is, in some instances, a real annoyance, but it is certain such condition will not exist for long, and purchasers will soon be able to enter a salesroom, select their vehicles and ride home in them, just as it is now possible to do in the case of the bicycle.

Gradually the methods of specialization in manufacture will be adopted, and the more such methods are introduced the quicker will it become possible for buyers to select what they want right on the spot and not have to wait, as is now so often the case.

Unquestionably the exhibition now going on at Madison Square Garden, as well as that which is to follow it at Grand Central Palace, from November 14 to 24, will give to the automobile industry an unusual impetus, commercially and socially.

Undoubtedly many will be present at both of the shows referred to who will have their interest deepened in the manufacture and operation of automobiles and the fact that the first one is under the auspices of the Automobile Club of America, which comprises some of the leading families in the country, will give to it a dignity it would not otherwise have.

The event ought to prove quite a society triumph and bring to our city many members of the representative families of the country. Let us hope this may be so, and that the Automobile Show may become as unique and attractive an event as is the Horse Show.

The Automobile Index

Everything of permanent value published in the technical press of the world devoted to any branch of automobile industry will be found indexed in this department. Whenever it is possible a descriptive summary indicating the character and purpose of the leading articles of current automobile literature will be given, with the titles and dates of the publications.

Automobile, Electric—

Illustrated description of a vehicle which when loaded has a weight of twenty tons. Battery is of the Phœnix pattern, with sufficient capacity for a run of 25 miles. "Electrical Review," New York, October 10, 1900.

Automobiles, Their Imperfections—

By W. H. Booth. An article in which the writer treats of the qualities of the horse as compared with the automobile. "American Machinist," New York, July 26, 1900.

Carriage, Electric—

Very complete illustrated article descriptive of the Joel electric vehicle. "The Automotor Journal," London, October, 1900.

Controller, Automobile—

Description, with illustration, of a new type of controller which may be used on practically all types of electric vehicles. "Electrical Review," New York, October 17, 1900.

Cooling Device for Motors—

Describes the Macquart device for cooling motors by a circulation of air, "Automobile Topics," October 20, 1900.

Gasoline Motor, Construction of a—

One of a series of articles appearing in the "Motor Vehicle Review," of Cleveland, by C. C. Bramwell, in which instructions are given as to how such vehicles ought to be built. The article is illustrated. "Motor Vehicle Review," Cleveland, October 11, 1900.

Gear, Spur Equalizing—

Illustrated description of a type of gear to meet requirements of all motor vehicles in which spur gearing is used throughout. "Motor Vehicle Review," Cleveland. October 11, 1900.

Gears, About Change—

An article by M. C. Krarup, in which he studies the problems involved in regulating the speed of motor vehicles. "Motor Age," Chicago, October 18, 1900.

Governor, Speed—

Illustrated article describing an automatic governor for electrically propelled vehicles. "Electrical World and Engineer," New York, September 29, 1900.

Ignition Tubes—

An illustrated description of a system of tube ignition invented by M. Collin-Dufresne. "Autocar," London, October 6, 1900.

Inflator, Tire—

Illustration and description of a power-driven inflator used on the "Napier" of Mr. Kennard, in which he brings the engine into use for operating it. "The Motor Car Journal," London, October 13, 1900.

Motor, Bicycle—

Illustrated description of the Holley machine, showing its various parts. "The Motor Vehicle Review," Cleveland, October 18, 1900.

Motor Car, The Luflury—

Illustrated description of a car which was exhibited at the Paris Ex-

position. The particularly new feature about the car is the variable speed-gear adopted, which is arranged to give five speeds forward and three backward. "The Motor Car Journal," London, October 13, 1900.

Motor Carriage, The Spiller—

Description and illustration of a new style of gasoline vehicle possessing a number of new features. "Motor Vehicle Review," October 11, 1900.

Motor Vehicles for Road Service, Heavy—

By Fred. W. Maynard. An article dealing with the specific forms of motor-wagons which have proved successful in England. "Engineering Magazine," New York, September, 1900.

Panhard and Levassor—

Illustrated description of a twelve horse-power machine of the type named, fitted with both electric and tube ignition. "The Autocar," London, October 13, 1900.

Plug, Electric Ignition—

Illustrated article, descriptive of a new form of plug, in which baked soapstone (steatite) is used for the insulating material instead of porcelain. "The Automotor Journal," London, October, 1900.

Runabout, Light Electric—

Illustrated description of a new runabout designed by Mr. Walter Baker, of Cleveland. Its total weight is less than 500 pounds, the batteries weighing only 186 pounds. The vehicle can be run 30 miles on one charge. "Electrical Review," New York, October 10, 1900.

Stanhope, Electric—

Description of a new vehicle which has just been placed on the market. "Electrical Review," New York, October 17, 1900.

Vaporizer, Oil Engine—

An article describing an engine recently designed by Mr. Torbensen in which the vaporizer serves to ignite the explosive mixture after the engine has been started. "The Automotor Journal," London, October, 1900.

Vehicle, Construction of a Motor—

By L. Elliott Brookes. Part III. of a series of articles which go into the practical construction of a carriage adapted for use in connection with a four horse-power gasoline motor. "Motor Age," Chicago, October 18, 1900.

Vehicle, Racing—

Illustration and description of a very powerful motor-car used for racing purposes. It is of thirty horse-power. "The Autocar," London, September 29, 1900.

Vehicle, The Reading Steam—

Illustrated description of one of the late type of carriages. "Motor Age," Chicago, October 18, 1900.

Vehicles at Paris Exposition—

An illustrated article in which are given descriptions of a large number of the leading motor vehicles that were exhibited. The article is very complete and is accompanied by a goodly number of illustrations. "Automotor Journal," London, October, 1900.

Voiturette, Progress—

Illustration and description of a carriage of attractive appearance. "The Autocar," London, October 6, 1900.